Compaq Clustering Solutions for Windows NT

DIGITAL Server Cluster Kits for Windows NT
Configuration Guide v2.73

November 1998

Prepared by:
Clustering Product Management
Compaq Computer Corporation

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Compaq Clustering Solutions

Compaq Clustering Solutions for Windows NT maximize access to enterprise data by providing a means by which users can continue working even in the event of a server failure. These high-availability solutions allow a pair of DIGITAL Servers running Windows NT to be managed and accessed as a single system and support both DIGITAL Clusters for Windows NT (DCNT) and Microsoft Cluster Server (MSCS) as part of Microsoft Windows NT Server, Enterprise Edition. System-level high availability is assured through dual active servers, shared SCSI, optional redundant power supplies and a redundant interconnect between the nodes. The addition of subsystem RAID Array assures high availability of shared data.

Clustering

The cost of downtime has been reported to be anywhere from $1,400/minute to $130,000/minute, depending on your particular business. The need to keep your systems up and running in this high technology era is critical to save not only thousands and sometimes millions of dollars, but to maintain user productivity and customer satisfaction as well.

With the introduction of Windows NT Server Enterprise Edition, Microsoft has brought clustering capabilities to the mainstream. Clustering provides high availability for server-based applications and file shares by loosely coupling two active servers with a shared disk subsystem. When one server goes down, the clustering software migrates applications, associated disks and file shares, and client workload to the other server without interruption at the client level. With a minimal hardware investment, any business can protect their mission-critical data and applications to maintain optimal user productivity.

DCNT is a proven, mature product. It supports IP address failover, enabling automatic failover for applications, such as Microsoft Internet Information Server, Netscape Enterprise Server, Lotus Notes and Lotus Domino, Microsoft SQL Server 6.5, Oracle 7 Workgroup Server, and Oracle 7 Enterprise Server 7.3. A Migration Wizard utility provides easy migration from DCNT to MSCS.

Compaq's clustering technology provides industry leadership for application availability, scalability for data storage and user support, cluster system management, high speed storage interconnects, high performance TP, and Disaster Tolerant capabilities for Windows NT systems.

Why Compaq

DIGITAL, a pioneer in cluster technology, has been shipping cluster solutions since 1983, including DCNT for a full 18 months before MSCS. With over 75,000 installed clusters and 500,000 clustered nodes deployed across Windows NT, DIGITAL UNIX, and OpenVMS, including over 7,000 DCNT licenses, DIGITAL, now Compaq, is unquestionably the market leader. In fact, Compaq has more experience with clustering and more engineers trained to support Windows NT than any other vendor, including Microsoft.

Hardware

Customers have the option of purchasing DIGITAL Servers for Windows NT (Intel or Alpha-based) for their cluster. Providing customers with a totally scalable solution, the DIGITAL Server product line extends the Intel-based server products for NT, offering quad processors for additional performance and into the Alpha-based DIGITAL Server products. Compaq also offers external RAID Arrays -- all certified to run with both DCNT and MSCS. Redundant controllers, power sources, and cooling fans help your high-availability configuration to approach levels of fault-resilience.

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Cluster Kits

Compaq provides complete clustering solutions with hardware, tools, services, and support for the Windows NT environment. To ensure proper configuration and implementation of the clustering hardware and software infrastructure, Compaq provides a series of Cluster Kits, which include:

- Storage array with RAID controllers
- Ultra SCSI or Fibre Channel adapters
- RAID software and firmware
- Private network adapters between servers
- Cables and terminators
- ServerWORKS Manager software
- Cluster documentation

Interconnects

Compaq provides a range of interconnect solutions to meet the needs of high availability clustering requirements from entry level to enterprise-level environments. As clusters move from two-node high availability to multi-node high performance scalable clusters, the need to support the infrastructure for both storage and cluster node communication becomes critical. Clusters use two types of interconnects:

- **Storage Interconnects**

  For two-node clusters, Compaq provides ultra-SCSI interconnects. For more than two-node clusters, SCSI Hub technology eliminates multi-node and bus length restrictions. For high performance multi-node environments, Fibre Channel and fault tolerant solutions will be provided.

- **Cluster Interconnects**

  For two-node clusters, Ethernet provides sufficient bandwidth to support failover between servers. As the number of servers in a cluster grows, (OPS, multi-node clustering) Compaq plans to offer support for high performance, low latency interconnects.

Tools

Solution Sizer and ServerMaker tools provide sizing and configuration assistance for Windows NT Clustering Solutions. These tools are provided to Compaq's Business Partners, sales people and systems engineers.

Solution Sizer

Solution Sizer eliminates the guesswork involved with sizing servers and clusters by determining the key server characteristics that will ensure a successful business solution. Through a "wizard" style interview process, the user provides customer-specific information about their business needs and environment. Solution Sizer acts as a personal characterization consultant, analyzing the data to determine key sizing metrics for the specific application. Solution Sizer draws on vast characterization data compiled by Compaq's performance labs, to recommend an appropriate server configuration.

Solution Sizer is capable of sizing server solutions for popular internet/intranet, mail and messaging, and other business applications. The tool is updated frequently to add to the portfolio of application solutions

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that it can size. Solution Sizer is also linked to ServerMaker, which provides detailed, validated server configuration data, including parts lists and reseller-specific pricing data.

ServerMaker

ServerMaker is an easy to use, Windows-based, interactive software configuration tool designed to lead the user step-by-step through the DIGITAL NT Server configuration process. ServerMaker accurately and easily configures single DIGITAL Servers or NT Clusters, and provides both pedestal and rackmount configurations. ServerMaker has a point-and-click interface, and is robust, but not resource intensive. It runs on any Microsoft Windows 95 or Windows NT industry standard desktop or notebook PC.

At the end of your ServerMaker session, you can generate a parts list. Price files are not included in ServerMaker. However, you can obtain a copy of the DIGITAL Server price file (in Excel format) from the DIGITAL Business Link, or your authorized Compaq representative to load into ServerMaker for quoting purposes.

You can download both Solution Sizer and ServerMaker at:

http://www.businesslink.digital.com

ServerWorks Manager

ServerWORKS Manager enables system administrators to monitor cluster resources and generate alarms in the event of a failover. See the *Using ServerWORKS Manager with Clusters* section for instructions on how to use ServerWORKS Manager to perform these operations.

ClusterWORKS

The ClusterWORKS program includes a variety of tools to assist customers in configuring their cluster. The Cluster Checkout Utility verifies the hardware installation, by identifying problems and recommending solutions.

For those customers that choose to migrate from DCNT to MSCS, there is a Migration Wizard. With an easy-to-use graphical interface, the Migration Wizard retains the customer's system administrative investment in clustered file shares, IP, and script objects.

Cluster Quick Start

Whether you are using MSCS or DCNT to create a highly-available computing environment, the installation consists of many hardware and software components and procedures. To get you started, the Cluster Quick Start provides a high level, generic overview of the cluster installation and configuration process using a RAID Array and two DIGITAL Servers. These instructions include general steps for both DCNT and MSCS and includes pointers to resources for detailed instructions.

You can download the Cluster Quick Start from our internal web site at akin40.mro.dec.com. It will also be included in future Cluster Kits.

Enterprise Cluster Software

Visual Batch enables system administrators to quickly build batch jobs on clusters using a graphical user interface.

Enterprise Cluster Software for Windows NT will bring OpenVMS cluster technology to complement MSCS by providing:

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- A shared disk pool to farm out disk space as virtual disks. This technology is based on a proven shared-disk technology. To date, there are over 500,000 OpenVMS "shared everything" clustered systems.
- Mirrored cluster support to provide disaster-tolerance.
- Support for more than two servers in a cluster, appearing as if they're the same disk.
- SnapShot Services to back up a system's metadata before upgrading to a new release. If the customer has problems with the upgrade, SnapShot allows the system administrator to roll back to the captured configuration.

Enterprise Cluster Software for Windows NT will provide functionality that won't be available on MSCS for at least 18 months!

Worldwide Service and Support

Compaq's Customs Systems offers *Ready-to-Go* clusters, providing custom configured Intel or Alpha-based DIGITAL Servers with storage in a rackmount configuration. All components are preinstalled, preconfigured, and pretested to the customer's specifications, getting the customer up and running fast. These systems can be configured before they leave the factory or at the customer's site.

Compaq endorses a 99.5% uptime guarantee for business critical systems. To back up this guarantee, Compaq has built a worldwide support infrastructure with over 1,700 Microsoft Solution Providers and over 5,000 support certified professionals on Microsoft products. *In fact, Compaq has more Microsoft-certified professionals than Microsoft and Dell combined!*

Compaq provides next-day service warranty for three years, which can be upgraded to same day response. Compaq also provides total lifecycle support with a single point of accountability for multi-vendor support. Services include design, implementation, installation, and startup.

Highlights

Compaq Cluster Solutions:

- Offer a proven, low-cost, high-availability solution for PC client/server LANs using Windows NT systems.
- Minimize user downtime by automatically and transparently failing over to a second server, maximizing productivity by making both servers available for user and application workloads at all times.
- Provide broadest, most scalable range of servers and storage for Windows NT, enabling businesses to grow their processing, storage and I/O capacity, maximizing their investment protection.
- Combine prepackaged tools and applications to help you build and administer clusters, including OS Dependent Module (OSD) for Oracle Parallel Server on Windows NT.
- Provide ServerWORKS Manager, which enables system administrators to monitor cluster resources and generate alarms in the event of a failover.
- Provide turnkey cluster solutions that are preinstalled, pretested, and preconfigured per customer specifications for fast startup.
- Offer a worldwide infrastructure of support and services with the largest number of Microsoft Solution Providers.

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- Qualify and certify DIGITAL Server 1000, 3000, 5000, and 7000 families with currently supported processor variants on Microsoft's Hardware Compatibility List. This enables your system to be supported by Microsoft technical assistance.
- Qualify and certify DIGITAL hardware for use with DCNT and MSCS. Configurations listed on Microsoft's Hardware Compatibility List enables your system to be supported by Microsoft technical assistance.

Microsoft Cluster Server

Microsoft Cluster Server (MSCS) is a built-in feature of Windows NT Server, Enterprise Edition (released September 1997). It supports the connection of two servers in a cluster for higher availability and easier manageability of data and applications.

MSCS provides a single, virtual image of the servers in a cluster to clients. If one server fails, the applications on the failed server are available on the other server. (You can also fail over *groups* of network applications, data files, and tools using an IP address, network name, physical disk, and generic or customer application or service.) During the failover process, client communications with applications usually continue with little or no interruption. MSCS can detect interruptions in service in less than 5 seconds and can make services available in less than 30 seconds, depending on how long it takes to start the application.

You can also use MSCS to move workload between servers to balance utilization and plan for maintenance without downtime.

MSCS consists of two major components:

- **Cluster Software** – runs on every server to exchange messages that trigger the transfer of resources and operations in the event of a server failure. Cluster software consists of:
  - *Cluster Service* that runs on each server in a cluster, keeps track of the current state of the servers, and determines when a server's group and resources should fail over to the other server.
  - *Resource Monitor* that facilitates communication between the Cluster Service and application resources.
- **Cluster Administrator** – is a graphical application that manages clusters, so that you can:
  - Specify the applications and related components that run on each server
  - Manage services, file shares, and directory replication
  - Establish failover and failback policies (set failover threshold and failover period) and:
    - Specify the order when resources fail over and fail back
    - Specify the order in which groups fail over
    - Specify resources and group properties affecting the failover policy
    - Bring groups online and take groups offline
    - Manually move groups between servers
  - Determine which servers are running applications and services
  - Review activities and failures of components in a cluster
  - Manually take servers offline for maintenance

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Many applications can be adapted to take advantage of MSCS' failover feature. These applications must be able to use TCP/IP and use remote storage for its data. (Applications that keep a significant state information in memory are not the best applications for clustering because any data not stored on disk is lost at failover.) Applications that can be failed over can support MSCS API or not. Those applications that support the MSCS API are *MSCS-aware*. MSCS-aware applications can be registered with the Cluster Service to receive status and notification information and use the MSCS API to administer clusters.

Although MSCS protects the availability of data, not the data itself in a cluster, the Windows NT Server has built-in features including mirroring and redundant array of inexpensive disks (RAID Level 5, stripping with parity). The following table lists common points of failure in a Windows NT Server environment and suggests protection methods:

Point of Failure	MSCS	Other
Network hub	Redundant networks	Consider stocking replacement network components
Power utility		Uninterruptable power supply (UPS) provides power for 5 to 20 minutes for a proper shutdown
Disk		RAID array
Server hardware (CPU or memory)	Failover	DIGITAL Servers 5000 and 7000 series provide redundant power and cooling
Storage	Failover	StorageWorks RA3000, 450, 7000 offer redundant power, cooling, cache, controllers, cache batteries Consider stocking replacement disks, controllers, SCSI components
Server software (operating system or applications)	Failover	
WAN links (routers and dedicated lines)		Redundant links over the WAN, providing secondary access to remote connections
Dial-up connection		Multiple modems
Computer		Multiple clients for the same level of access

Any client that can connect to Windows NT Server through TCP/IP will work with MSCS. This includes Microsoft MS-DOS®, Microsoft Windows® 3.x, Windows 95, Windows NT, Apple® Macintosh®, and UNIX®. MSCS does not require any special software on the client for transparent recovery of services that connect to clients through standard IP protocols.

For more information on MSCS, see http://www.microsoft.com/ntserver/support/clusterfaq.asp#basics.

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DIGITAL Clusters for Windows NT

DIGITAL Clusters for Windows NT (DCNT) is a layered application on top of Windows NT. It is based on open industry standards and commodity building blocks. Important components are dual active servers, shared external SCSI storage and a GUI-based cluster configuration manager. DCNT has provided the benefits of clustering on Windows NT since 1996.

Highlights

- Offers a reliable and low-cost, high-availability solution for PC client/server LANs.
- Minimizes user downtime by automatically and transparently failing over to a second server; maximizing productivity by making both servers available for work all the time.
- Ensures investment protection for existing client applications, which run without modification using NTFS failover.
- Allows the initiation of manual failover, so that preventive maintenance, user load balancing, or system upgrades can be performed without disruption.
- Offers a choice of servers and CPUs with select SCSI and network adapters for ease of integration and configuration flexibility.
- Unique failback capability enables a failover group to migrate back to the original server when the server is brought back online.

Features

- **System-level high availability**

  System-level high availability is assured through dual active servers, shared storage, optional redundant power supplies and a redundant interconnect between the nodes to ensure highly available data paths.

- **Maximum access to enterprise data**

  For the user, the cluster is accessed like a single server.

  Automatic failover of database and file services is provided without system administrator or end-user/client intervention.

- **Greater manageability and flexibility**

  DCNT includes a GUI to specify which disks, shares, and applications need to fail over together.

  Every DIGITAL Server comes bundled with ServerWORKS Manager software to ease the burden of managing the LAN. ServerWORKS™ Quick Launch simplifies installation and setup.

- **Designed for the Windows NT environment**

  This system is designed to be consistent with standard client/server workloads and usage models to provide maximum uptime for the most critical client/server applications.

- **Failover Manager**

  The Failover Manager monitors events that may call for a failover, determines which services should be failed over and manages them until service is resumed.

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- **Remote Cluster Administrator**

  Remote Cluster Administrator that provides remote cluster management functions enabling the user to manage any cluster from a Win95 or Windows NT workstation or server.

- **Scalable design**

  Scalability of each server allows for growth in processing, storage and I/O capacity to maximize investment protection ranging from 1000 to 7000 series servers.

DCNT v1.1 SP2

The latest Service Pack for DCNT (v1.1 SP2) is available for download from:

Externally - http://www.windows.digital.com/clusters

Internally - http://ntsssweb.zso.dec.com/ntnone/clusters/dcnt.htm

This release is also included with the FR-CK450-RP/RR DIGITAL Server Cluster Kits.

DCNT V1.1 SP2 contains:

- Remote Cluster Administrator that provides remote cluster management functions enabling the user to manage any cluster from a Win95 or Windows NT workstation or server.
- Supports IIS 4.0 and Netscape SuiteSpot 3.0
- Enhances SQL configuration and deployment
- Fixes SQL bugs including:

  Vstart uniqueness

  Lstart duplicate

  Inconsistent fallback tables

  Binary sort order

  Fallback table integrity

For more information about DCNT, see http://www.windows.digital.com.

Upgrading from DCNT v1.0 to v1.1 SP2

This configuration guide is designed to assist the reader with new NT cluster purchases. For existing DCNT v1.0 users, an upgrade software package is available using part number QB-53V9B-MA, which includes:

- Media
- Documentation
- Upgrade licenses for two servers
- Readme first document

Note: *QB-53V9B-MA also requires the purchase of a DCNT v1.1 software, obtained through a DIGITAL Server Cluster Kit (FR-CK450-RP/RR only). Otherwise, you must order it separately using part number QB-53V9A-SA.*

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DCNT V1.1 SP1

Although only billed as a service pack, v1.1 SP1offers some fairly significant new functionality, including some of the most-requested enhancements to the product:

- **DCNT IP Address Failover Support for File Shares**

  DCNT provides the ability to failover a NetBIOS over TCP/IP (NetBT) name in association with an IP address. The feature enables the capability of failing over file shares, which can be accessed over a wide area network using TCP/IP.

  Support is provided in the Cluster Administrator for specifying NetBIOS Names in association with IP failover objects.

  A NetBIOS Name is used to identify a host for providing LAN Manager services, such as file shares or named pipes. Also, since the LAN Manager protocol is actually contained inside TCP/IP packets, the NetBIOS Name is associated with an IP address.

  LAN manager services, such as file shares, are made accessible on a wide area network by layering them on top of TCP/IP. This is accomplished using "NetBIOS over TCP/IP" (NetBT).

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For details on setting up and using this new feature, see the "DIGITAL Clusters for Windows NT Administrator's Guide Addendum".

- **DCNT Elimination of Client Software Requirement**

  Clients do not need to install cluster client software if they plan to access only socket-based applications or NTFS file shares through a TCP/IP connection on DCNT V1.1 SP1.

  Compaq recommends that you configure IP failover for new cluster installations. IP failover offers the following advantages:

  - Eliminates the need to install cluster client software. On a large network, this saves both time and disk space.
  - Eliminates the possibility of compatibility problems between the cluster client software and 3rd party networking products.

Note: *One example of a product that previously conflicted with the cluster client software was Citrix WinFrame, which should be supported in a clustered environment, according to Clusters product management.*

  - Allows WAN access to NTFS file shares.

  You can install cluster client software on Windows NT, Windows 95, and Windows for Workgroup systems that need to access the cluster by using the cluster name alias.

- **DCNT SQL Server Support Enhancements**
  - Any DCNT stored procedures that are not in the SQL Server master database are automatically detected and installed when the system is rebooted.
  - Uninstalling DCNT deletes all the DCNT stored procedures introduced to your SQL server during DCNT installation.
  - You cannot manually failover groups that contain disks on which unenrolled SQL Server databases reside. With SQL 6.5, attempting to manually failover these groups caused problems. If you attempt it, you will see an error message displayed and the group will remain online on its current server until all the unenrolled databases are enrolled.
  - Before bringing up the Manage SQL Server Databases dialog, the Cluster Administrator fetches information about SQL Server databases. Prior to SP1, the user had to manually refresh if databases had been created since the Cluster Administrator was invoked.
  - You can no longer delete nor modify SQL Server failover objects. These operations were no longer necessary in V1.1, but the menu options were still available. Deletion and modification of SQL Server failover objects takes place automatically by using the Manage SQL Server Databases menu choice.
  - In a previous version of DCNT, the user had to create all SQL databases from the same server. This restriction no longer applies.

The SQL server support enhancements, as well as the bug fixes incorporated into SP1, are also available for NT 3.51 installations with DCNT v1.0, in the form of SP3. The IP failover capabilities, along with the elimination of the client software requirement, both require NT 4.0 and DCNT v1.1.

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Upgrading from DCNT to MSCS

DCNT's Migration Wizard helps customers migrate from DCNT V1.1 to MSCS. The Migration Wizard has two major components:

- MIGWIZ/RDC (Read DIGITAL Clusters) - checks to ensure that DCNT is installed, reads the DCNT configuration, and writes that information to a file.
- MIGWIZ/CCS (Configure Cluster Server) - using the configuration information stored by MIGWIZ/RDC, configures MSCS.

In addition, the Migration Wizard provides:

- DIGITAL Custom Resource DLL Registration Tool that automatically registers DIGITAL custom resource DLLs.
- A Generic Script DLL that enables the creation of a script failover resource to run NT command scripts when a resource group come online or goes offline.

It is important that your configuration is listed on Microsoft's Hardware Compatibility List. This enables your system to be supported by Microsoft technical assistance. To see if your configuration is supported, go to:

www.microsoft.com/hwtest/hcl

Select **Cluster** in the first field; **Digital Equipment Corp**. in the second field.

If you have a certified configuration, you can either contract with Multivendor Customer Service (MCS) to install the Migration Wizard software and check your system or install the Migration Wizard software and check it yourself. If you want DIGITAL to install the software, contact MCS and ask for part number, QR-SMWNT-BL. If you want to install the software yourself, you can download it from:

http://www.windows.digital.com/clusters/migration/configs2.asp.

Typical DCNT Environment

Supported Servers: DIGITAL Server 1000, 3000, 5000, 7000 families and CPU variants

Operating System: Microsoft® Windows NT 4.0 with Service Pack 3

Failover Services: DCNT software supports failover of:

- NTFS File System
- Microsoft SQL Server 6.5
- Oracle Workgroup Server 7.1 and 7.2
- Lotus Notes Domino 4.6
- Microsoft Internet Information Server 4.0
- Netscape SuiteSpot Server 3.0
- Generic application failover via scripting

Network Protocols: TCP/IP, NETBEUI, IPX/SPX

Hardware: Dual Intel-based or Alpha-based DIGITAL Servers, dual PCI Fast-Wide SCSI host adapters/cables, external shared Hot-Swap storage (RAID or JBOD), dual PCI Ethernet

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Client Support: Windows NT 4.x, 3.51, Windows for Workgroups 3.11, Windows 95

Supported DCNT Hardware

DCNT v1.1 SP2 has been qualified in the following configurations using DIGITAL Servers:

Note: *Before using any of the hardware listed, consult the documentation for your system to be sure the options you selected are also supported on that system. Both DCNT and your system must support the hardware in your cluster configurations.*

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Server Family	Cluster Kit	Storage	Host Bus Adapter	Network Controller	Min SCU (Intel) Or Min ECU (Alpha)	System BIOS (Int Or Min ARC Firmwa
12xx	RA310	RA310[3] or RA3000	2944UW[1]	FR-DE500-BA	V1.10e	V2.06
31xx	RA310 RA450 BA356 RA3000	RA310[3] or RA450[3] or BA356 or RA3000	2944W[1] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V1.10e	V2.06
32xx	RA310 RA450 BA356 RA7000 RA3000	RA310[3] or RA450[3] or BA356 or RA7000 or RA3000	2944W[1] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V1.01.01	V1.10
33xx	RA310 RA450 RA7000 RA3000	RA310[3] or RA450[3] or RA7000 or RA3000	KZPSA[2] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V1.10	AlphaBIOS V5.64
AlphaServer 800	RA3000	RA3000	KZPBA-CB[2]	FR-DE500-BA	V1.10	AlphaBIOS V5.64
51xx	RA310 RA450 RA7000 RA3000	RA310[3] or RA450[3] or RA7000 or RA3000	2944W[1] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V1.08e	V1.10
52xx	RA310 RA450 RA7000 RA3000	RA310[3] or RA450[3] or RA7000 or RA3000	2944W[1] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V1.08e	V1.10
53xx	RA450 RA7000 RA3000	RA450[3] or RA7000[3] or RA3000	KZPSA[2] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V1.10	AlphaBIOS V5.65
AlphaServer 1200	RA450	RA450[3]	KZPBA-CB[2]	FR-DE500-BA	V1.10	AlphaBIOS V5.65

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71xx	RA310 RA450 RA7000 RA3000	RA310[3] or RA450[3] or RA7000 or RA3000	2944W[1] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V3.30	V1.00.07 BGO
73xx	RA310 RA450 RA7000 RA3000	RA310[3] or RA450[3] or RA7000 or RA3000	KZPSA[2] or 2944UW[1]	FR-DE500-BA or FR-DE500-AA or FR-DE450-CA	V1.10	AlphaBIOS V5.65

1. 2944UW and 2944W host adapters on:

   - Intel-based DIGITAL Servers require the 1.25c version of the Adaptec driver (file name AIC78XX.SYS, file version 4.0 internal name BW0045a PV0145a v1.25c, original date 5/1/97, using Explorer, the file size is 27 KB) that comes with N the HSZ driver, the version numbers for both the Adaptec 294X and HSZ are displayed as part of the installation proces

   Note: *QuickLaunch automatically installs the 2.11 Adaptec driver. If you need to use the 1.25c Adaptec driver, uninstall the 2 reinstall the 1.25c driver from NT 4.0 SP3.*

   - Alpha-based DIGITAL Servers require the 2.11 s29 version of the Adaptec driver that comes with DIGITAL Server Clu download the 2.11 s29 version of the Adaptec driver, go to akin40.mro.dec.com and select **Clusters**, select **DIGITAL S Adaptec 2944 UW Driver v2.11 s29 (DIGITAL Alpha Servers)**.

2. KZPxA host adapters require the 1.41 version of the DCNT driver (DECKZPSX.SYS) that comes with DCNT.
3. Requires the HSZDISK 4.0 SCSI class driver from StorageWorks that comes with DIGITAL Server Cluster Kits. See www.s information on storage.

- The RA310 Cluster Kit (FR-CK310-RF) has been EOL.
- All systems contain both (E)ISA and PCI bus.
- Supports both single and multiple processors on DIGITAL Servers, except for the 12xx and 33xx, which are single processo

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Differences between DCNT and MSCS

Here's a quick summary of the differences between DCNT and MSCS so that you can decide which product best meets your customer's needs.

Feature	DCNT	MSCS
Cost	$995 per server and $1990 per cluster plus the cost of NT 4.0 Standard Edition for each server Upgrade price for customers is $390 Low cost, high availability solution for a Windows NT client/server environment across LANs	$4,000.00/server (includes NT) High cost, high availability solution for a Windows NT client/server environment across LANs
Market segment	Entry level , low to mid range Great as a pilot to try clusters on Windows NT	Enterprise level, mid to high range
Architecture	Proprietary	Industry accepted standard
Overall cluster experience	Delivering clusters for the past 15 years	None
Windows NT cluster experience	Delivering clusters on Windows NT 18 months before MSCS with a total of 7,000 DCNT licenses	Delivering clusters on Windows NT since November 1997
Client support	Windows NT 4.x, 3.51 Windows for Workgroups 3.11 Windows 95	Windows NT 4.x Windows 95
Runs on NTS 4.x Standard Edition	Yes	No
Runs on NTS/E 4.x Enterprise Edition	No	Yes
API to make applications cluster-aware for failover support	No	Yes for all BackOffice applications
Generic application failover via scripting	Yes	No, but can use API
NTFS failover	Yes	Yes
Failover of applications based on IP address	Yes	Yes
File shares failover	Yes	Yes
Microsoft SQL Server 6.5 failover	Yes – Standard Edition	Yes

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Oracle failover	Yes (7.x) – Workgroup and Enterprise Editions	Yes (8.x)
Lotus Notes Domino failover	Yes - 4.6 Active/Active support through partitioned Domino servers	Yes
Netscape SuiteSpot Web Server 3.0 failover	Yes	Yes
Microsoft Internet Information Server failover	Yes (version 3.0)	Yes (version 4.0)
Microsoft Exchange Server failover	No	Yes
Manual failover for maintenance	Yes	Yes
Failback capability to reconnect fixed server that previously failed	Yes	Yes, manual and failback to time of day
Requires client software	No, if accessing only socket-based applications or NTFS file shares through TCP/IP on v1.1 SP1 clusters	No
IPX/SPX	Yes	No
NETBEUI	Yes	No
TCP/IP	Yes	Yes
Server platforms	DIGITAL Server families	Multi-vendor; Self-certification process
Extras	Migration utility to go from DCNT to MSCS	

Why Buy Clusters from Compaq?

- DIGITAL, now Compaq, has been delivering cluster solutions for the past 15 years with over 75,000 clusters installed.
- Compaq has more experience with clustering and more certified professionals trained to support Windows NT than any other vendor.
- Compaq can provide you with worldwide support and service.
- Compaq has the broadest, most scalable range of servers in the industry.
- Right now, if a 8-way Pentium Pro server does not provide you with sufficient headroom, there is only one vendor that can provide you with additional headroom, and that's Compaq with their 7300 series and their 8-way turbo laser Alpha-based servers.
- Compaq simply provides you with the broadest range of products, services, and solutions for Windows NT clustering.

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ServerWORKS Manager

Overview

For Compaq customers, server manageability is as important a requirement as system performance and reliability. Customers also need to manage more than servers. They need to manage desktop systems, the network, and mission-critical applications. Most of our customers have fairly complex environments, and therefore need management tools that are effective in a multi-vendor environment, as well as tools that scale well from the workgroup to the enterprise.

ServerWORKS Manager software, supplied with every DIGITAL Server, provides the tools administrators need to proactively manage their networks and the systems they support.

ServerWORKS Manager enables you to increase the effectiveness of your operation with SNMP management features, such as auto discovery, graphical topology map, and enrollment and browsing of SNMP MIB with smart server agents that provide a bird's eye view of your network. Launch ClientWORKS to access DMI-based management capabilities of your Windows NT servers, desktops, and laptops. Set alarms to enable proactive management of critical server parameters.

ServerWORKS Manager supports DIGITAL Servers running on a variety of operating systems, including Microsoft Windows NT, Novell NetWare, SCO UNIX, and DIGITAL UNIX. No matter whether your network challenge is large, medium, or small, ServerWORKS Manger can help you prevent problems before they occur.

Highlights

ServerWORKS Manager benefits the customer in a variety of ways:

- A user interface with Windows NT/Windows 95 look and feel minimizes learning curve and enables rapid productivity. Training time and expense is minimal.
- A single tool to manage both Intel-based and Alpha-based servers, running a wide variety of operating systems, simplifies the system administration task.
- ServerWORKS Manager can also be used to manage Compaq servers, increasing its value in heterogeneous environments, and facilitating the coexistence of DIGITAL and Compaq servers.
- Industry-standard SNMP protocol facilitates integration with other system management tools, including the most popular enterprise management products.
- Flexible alarm filtering, policies and actions provide the ability to respond quickly to critical events with appropriate actions.
- The topology map viewer lets the administrator see the state of the network at a glance.
- Smart Agents reduce network traffic without reducing the ability to monitor systems.
- Minimal health templates allow monitoring of critical system parameters "out of the box".
- Cluster management capabilities identify clusters in a network and apply management actions across all nodes.
- Online help and tutorial reduce learning curve and training requirements
- ODBC-compliant database for discovery and alarm data allows standard applications (e.g., Excel) to be used for data reporting and analysis

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Using ServerWORKS Manager with Clusters

A cluster provides high availability of services to the network. Typically, a cluster consists of two servers that are similarly configured with resources like applications, databases, and hardware components. When a server on which the resource groups reside is unavailable, another cluster continues to provide the resources. Reasons for unavailability include downtime for scheduled maintenance and backup or component failure of a resource, for example, a server goes down.

You must configure a cluster based on the operating system instructions.

Note: *DCNT and MSCS may use different configuration methods and terminology. When a cluster is operating, the server controlling a resource group is referred to as the controlling cluster. When the ownership of a group moves from one node to another, the action is called failover. If the ownership returns to the first server that was providing control of the resource group, the action is called failback.*

Discovering Clusters

IP Discovery finds DCNT and MSCS clusters on your network. You can set up cluster members to send SNMP traps when a cluster group fails over. The message indicates a transition of control from one cluster member to another. You can view the details about a cluster member using the System Browser. See Figure 1-1.

Figure 1-1 Discovered Clusters on a Map View

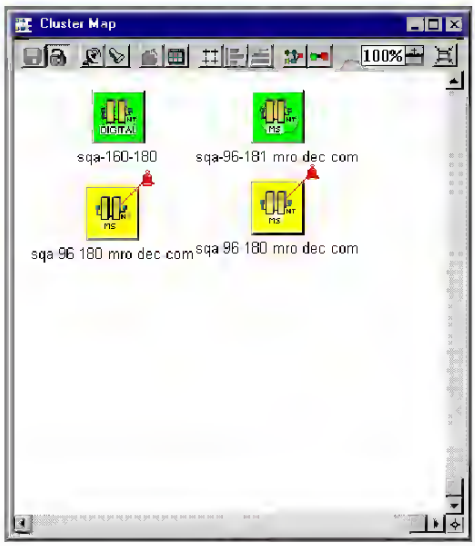

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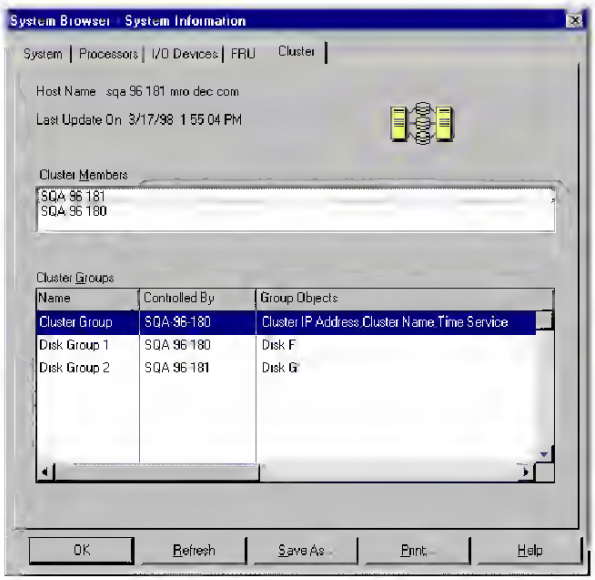
Figure 1-2 Cluster Member Information from the System Browser Window

Viewing Information about Cluster Resource Groups

1. Click the System Groups button.
2. Select the Cluster tab of the System Browser.

The servers in the cluster are listed in the Cluster Member list. The resource groups are listed in the Cluster Groups list. If the cluster members are configured with the same resources, the Cluster Group list is the same for each cluster member. See Figure 1-2.

Figure 1-3 Cluster Group and Resource Information from the System Browser



The ServerWORKS cluster agent runs on the cluster on which the agent is installed. The NTCMGT MIB defines a variable for DCNT and MSCS resource groups. ServerWORKS Manager Alarm Configuration

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sets up an alarm on the server Management agent (svrmgt) by getting information from the cluster agent. The ServerWORKS Manager trap message displays the name of the resource and a message that indicates transition of control from one server to another.

- Not Current Controller – The server sending this trap has lost control of a resource
- Current Controller – The server sending this trap has gained control of a resource

You can use the change in control to set alarms on resources. On a cluster of two servers, A and B, you can set alarms in the following ways:

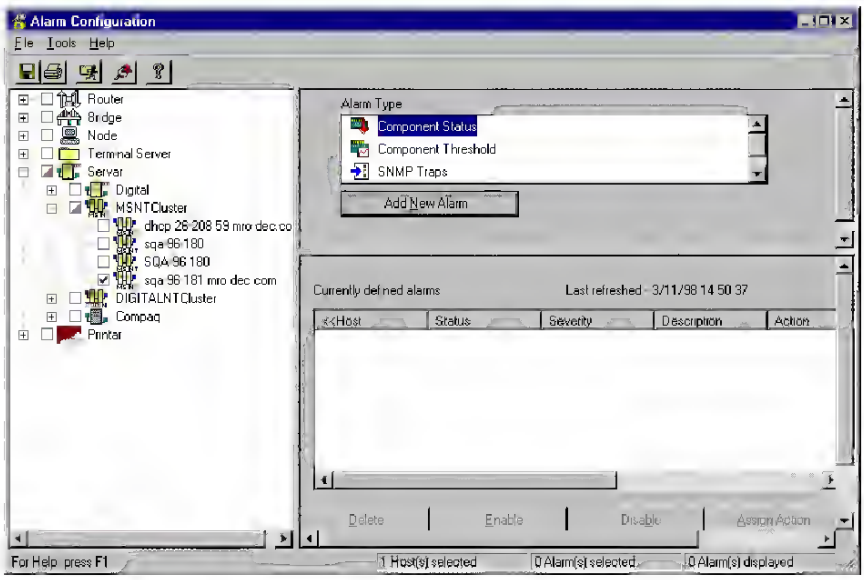
- Set a trap for Not Current Controller on Server A to indicate that Server A's control of a resource has failed over to Server B.
- Set a trap for Current Controller on Server B to indicate that Server B is in control of a resource.
- Set Not Current Controller and Current Controller trap alarms on the same resource to receive both messages. By using this scheme, you can determine if failover has occurred from a server that is not running. (A server that goes down cannot send a Not Current Controller trap, but the server that has assumed control can send a Current Controller trap.)

Setting an Alarm on a Cluster Resource or Group

From ServerWORKS Manager Console:

1. Choose Tools→Alarm Configuration.

Figure 1-4 Alarm Configuration Window



2. Select the object on which you are setting alarms in the tree control of the left pane.
3. From the Alarm Type group, select Component Status and click Add New Alarm.
4. On the Add New Component Alarm dialog box, click the Category tab. This dialog box also displays the selected server and any alarms that are set on the server. See Figure 1-5.

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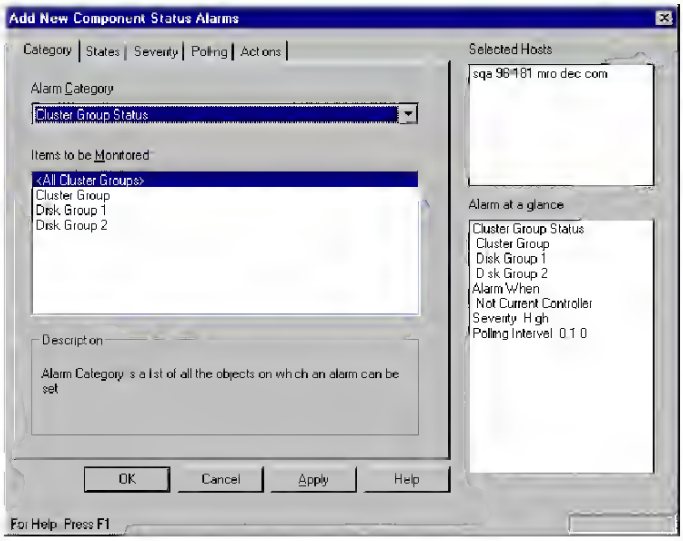
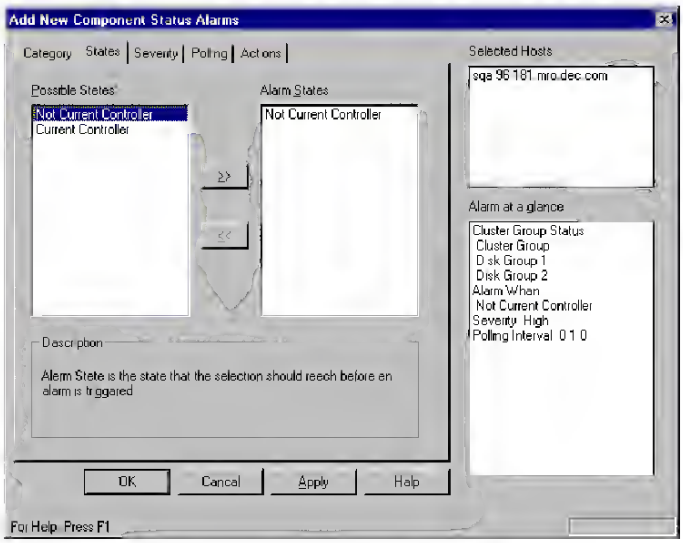
Figure 1-5 Add New Component Status Alarm Category Tab



5. From the Alarm Category drop-down list, choose the Cluster Group Status.
6. On the Items to be Monitored list, select the cluster resources on which you are setting the alarms. You can choose from:
   - All Cluster Groups (all resources that were defined when you created the cluster)
   - Any or all of the remaining resource groups. Different clusters will have different selections.

Figure 1-6 Add New Component Status Alarm Dialog Box



7. Click the States tab and set an alarm on the selected resources.
   - To show failover from Server A to the Server B, select Not Current Controller.
   - Click the Right arrow to add the state to the Alarms states list.

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8. Click the Severity tab and select a severity.
9. Click the Polling tab and set polling parameters.
10. Click the Actions tab and set actions you want to initiate when ServerWORKS receives the trap from the server management agent. You can:
    - Send an email notice.
    - Send a paging message.
    - Execute a program or script. For example, you can write a script the will run backup on a server if the server continues to run after a transition of resource. Refer to the cluster manufacturer's software documentation for information about scripts for the cluster.

Note: *Refer to the DIGITAL ServerWORKS Overview and Installation Guide for details about setting up notification actions.*

11. Choose OK.

Monitoring for Transitions

Use the Alarm Viewer to watch for transition activity on a cluster. From the ServerWORKS Manager Console, click on the Alarm Viewer status button for the severity that you chose for the Not current controller and current controller alarm. If a server resource has transitioned from one server to another, the alarm appears in the Alarm Viewer. Double-click on the alarm to see the details.

DIGITAL Server Cluster Kits

DIGITAL Server Cluster Kit Overview

The DIGITAL Server Cluster Kits are designed to simplify the ordering and building of a NT cluster using either DCNT or MSCS. DIGITAL Server Cluster Kits contain all the necessary base components, including:

- Storage array (both RAID and JBOD versions are available)
- SCSI bus hardware (host adapters, controllers/signal converters, cables and termination)

Note: *The NTSBU only supports the 2944UW on MSCS. However, we do support the KZPSA with DCNT. StorageWorks supports the KZ board with MSCS. You'll see a few of their configurations on Microsoft's HCL.*

- RAID controller (where applicable)
- Private network hardware (network adapters and cable)
- RAID Management software and firmware
- ServerWORKS Manager software
- Cluster Kit documentation
- Cluster Quick Start

The DIGITAL Server Cluster Kits **do not include**:

- Servers

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- Storage building blocks (hot-swap disks)
- Application software
- Windows NT Server, or Windows NT Server/ Enterprise Edition, which contains Microsoft Cluster Server
- Base Clustering software

Note: *DCNT is provided at no additional charge in the RA450 Cluster Kits. However, it must be purchased separately (use part number QB-53V9A-SA) if used with the BA356, RA7000, or RA3000 Cluster Kits.*

DIGITAL Server Cluster Kit Components

DIGITAL Server Cluster Kits include:

- **External Storage Cabinets**

  There are multiple options for external storage cabinets in the DIGITAL Server Cluster Kit family:

Note: *The FR-CK356-UP, UR, FR-CK700-UP, UR, and FR-CK300-UP Cluster Kits do not include DCNT. All Cluster Kits do not include NTS/E with MSCS.*

Note: *All Cluster Kits contain cables to support end-of-bus configurations for RAID arrays.*

BA356 Ultra Cluster Kits:

Pedestal version: FR-CK356-UP
Rackmount version: FR-CK356-UR

The non-RAID, BA356 Cluster Kit, supports up to 6 drives or 63GB of capacity using 9GB drives. The BA356 cabinet, included in the Cluster Kit, supports ultra wide, differential SCSI connections and ultra SCSI disks (40MB/sec). Customers can daisy chain up to 2 cabinets (together on a single SCSI bus to provide a total external storage capacity of 13 drives (117GB of storage when using 9GB drives). The expansion cabinet (FR-BA356-PA or PD) requires one of the base Cluster Kits. You can purchase a second 180 watt power supply (BA35X-HH) for redundancy.

The BA356 Cluster Kits support both Intel-based and Alpha-based DIGITAL Servers.

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FR-CK356-UP - BA356 Pedestal DIGITAL Server Cluster Kit

Original Part Number	Qty	Description
DS-BA356-KH	1	Ultra SCSI differential channel shelf, 2 dual speed blowers
FR-PCTAZ-FB	2	Adaptec 2944UW Differential Ultra Wide SCSI controller
SWDKT-DD	1	Cluster Enabling Kit (Windows NT Alpha Cluster Documentation) **Includes:** 2 Y-cables, 1 differential SCSI cable, cluster installation and configuration documentation, 2 terminators, updated RAID management software and licenses
BN37A-05	1	17-04377-08, 5M SCSI, FAST20 shielded cable assembly, 8MM
BN38E-0B	1	Ultra SCSI 17-04554-01 cable assembly .2M .8MM FE to 68HD M CONN
FR-DE500-BA	2	PCI to Fast Ethernet 10/100 UTP adapter with DECCHIP 21143
BN24Q-07	1	Crossover UTP cable (for private network)
QB-4QYAA-SA	1	ServerWORKS Manager 3.x
ER-CLUSU-IA	1	DIGITAL Server Cluster Installation Guide
QC-007AF-HC	1	Adaptec Alpha drivers and utility

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FR-CK356-UR - BA356 Rackmount DIGITAL Server Cluster Kit

Original Part Number	Qty	Description
DS-BA356-JF	1	Ultra SCSI differential channel shelf, 2 dual speed blowers **Includes:** Rack mounting kit for BA350/BA356 shelves in RETMA, two 19in mounting angles (4U)*
FR-PCTAZ-FB	2	Adaptec 2944UW Differential Ultra Wide SCSI controller
SWDKT-DD	1	Cluster Enabling Kit (Windows NT Alpha Cluster Documentation) **Includes:** 2 Y-cables, 1 differential SCSI cable, cluster installation and configuration documentation, 2 terminators, updated RAID management software and licenses
BN37A-05	1	17-04377-08, 5M SCSI, FAST20 shielded cable assembly, 8MM
BN38E-0B	1	Ultra SCSI 17-04554-01 cable assembly .2M .8MM FE to 68HD M CONN
FR-DE500-BA	2	PCI to Fast Ethernet 10/100 UTP adapter with DECCHIP 21143
BN24Q-07	1	Crossover UTP cable (for private network)
QB-4QYAA-SA	1	ServerWORKS Manager 3.x
ER-CLUSU-IA	1	DIGITAL Server Cluster Installation Guide
QC-007AF-HC	1	Adaptec Alpha drivers and utility

**Only needed for the older Rittal rack, which does not come with angle brackets.*

Note: *To mount a BA356 in a Rittal rack, you need the following parts:*

Metal Kit - 7033381-02
Cage Nuts - 9011476-01 (Qty 10)
M6 Screws - 9040331-01 (Qty 10)

RA450 Cluster Kit

Pedestal version: FR-CK450-RP
Rackmount version: FR-CK450-RR

The RA450 Cluster Kit supports up to 24 SBBs, which can consist of disk drives and cache batteries in hot-swap carriers. The pedestal enclosure supports up to 218GB; rackmount supports up to 873GB using 9GB disks. The RA450 supports SCSI disks of 1, 2, 4, 9, and 18GB (with HSOF 5.1) disks. The RA450 also supports dual redundant RAID controllers, eliminating the RAID controller as a single point of failure. The RA450 includes the StorageWorks HSZ50 controller, a 6-channel fast-narrow controller. Each channel is capable of supporting up to 7 drives, although no optional cabinets currently exist beyond 24 disks. No second expansion cabinet is available for the RA450. The RA450 supports RAID levels 0, 1, 0+1, and adaptive 3/5, as well as JBOD configurations.

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Note: HSOF firmware version 5.1 or greater (for the HSZ50 controller or RA450) is required for 9 GB disk support. This firmware is included in the Cluster Kit.

The RA450 Cluster Kit also includes DCNT, and only supports Intel-based DIGITAL Servers. However, you can order the following parts to build a version of the RA450 Cluster Kit that supports Alpha-based DIGITAL Servers:

- RAID Array 450 24 SBB Office Enclosure Storage Subsystem (DS-SWXRA-W0)
- Two PCI to Fast Ethernet 10/100 UTP adapter with DECCHIP 21143 (FR-DE500-BA)
- Two Adaptec 2944UW Differential Ultra Wide SCSI controller (FR-PCTAZ-FB)
- Crossover UTP cable for private network (BN24Q-07)
- Cable assembly (FR-BN38C-02)
- DCNT (QB-53V9A-SA)

FR-CK450-RP - RA450 Pedestal DIGITAL Server Cluster Kit

Original Part Number	Qty	Description
SWXRA-W0	1	RAID Array 450 24 SBB Office Enclosure Storage Subsystem. **Includes:** HSZ50 6 channel controller, tri-link with terminator, 32MB write back cache expandable to 64MB or 128MB, single cache battery in SBB with cable, 24 SBB wide SCSI cabinet for wide or narrow disk drives, 5 shelf power supplies optionally expandable to 8, 8 fans for fully redundant cooling, 5M host to controller cable, serial line assembly with adapters, environmental monitoring unit, controller to controller link cable for redundant controllers
QB-5JCAE-SA	1	RA450/HSZ50 Controller software kit for Windows NT/Intel. **Includes:** PCMCIA card with RA450/HSZ50 controller software, SWCC software, controller documentation, CLI and platform-specific documentation and software licenses
QB-53V9A-SA	1	DCNT **Includes:** software, documentation and licenses for 2 servers and unlimited clients
FR-PCTAZ-FB	2	Adaptec 2944UW Differential Ultra Wide SCSI controller
FR-DE500-BA	2	PCI to Fast Ethernet 10/100 UTP adapter with DECCHIP 21143
SWDKT-DD	1	Cluster Enabling Kit (Windows NT Alpha Cluster Documentation) **Includes:** 2 Y-cables, 1 differential SCSI cable, cluster installation and configuration documentation, 2 terminators, updated RAID management software and licenses
BN24Q-07	1	Crossover UTP cable (for private network)
QB-4QYAA-SA	1	ServerWORKS Manager 3.x

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FR-CK450-RR- RA450 Rackmount DIGITAL Server Cluster Kit

Original Part Number	Qty	Description
SWXRA-W4	1	RAID Array 450 24 SBB Rackmount Storage Subsystem **Includes:** HSZ50 6 channel controller, tri-link with terminator, 32MB write back cache expandable to 64MB or 128MB, single cache battery in SBB with cable, 24 SBB wide SCSI cabinet for wide or narrow disk drives, 5 shelf power supplies optionally expandable to 8, 8 fans for fully redundant cooling, 5M host to controller cable, serial line assembly with adapters, environmental monitoring unit, controller to controller link cable for redundant controllers, Metric rackmount kit for storage SW800 cabinet
QB-5JCAE-SA	1	RA450/HSZ50 Controller software kit for Windows NT/Intel **Includes:** PCMCIA card with RA450/HSZ50 controller software, SWCC software, controller documentation, CLI and platform-specific documentation and software licenses
QB-53V9A-SA	1	DCNT **Includes:** software, documentation and licenses for 2 servers and unlimited clients
FR-PCTAZ-FB	2	Adaptec 2944UW Differential Ultra Wide SCSI controller
SWDKT-DD	1	Cluster Enabling Kit (Windows NT Alpha Cluster Documentation) **Includes:** 2 Y-cables, 1 differential SCSI cable, cluster installation and configuration documentation, 2 terminators, updated RAID management software and licenses
BA35X-RJ	1	BA355 RETMA Mounting kit
FR-PCSRA-EA	4	RA450 mounting angles for NTSBU rack*
FR-DE500-BA	2	PCI to Fast Ethernet 10/100 UTP adapter with DECCHIP 21143
BN24Q-07	1	Crossover UTP cable (for private network)
QB-4QYAA-SA	1	ServerWORKS Manager 3.x

**Only needed for the older Rittal rack, which does not come with angle brackets.*

Note: *FR-CK450-RR does not include the DIGITAL Server rack or associated mounting components for rackmounting DIGITAL Servers. Rather, the RA450 Rackmount Cluster Kit includes all of the components necessary to add the RA450 into an 800mm or 900mm RETMA rack to build a cluster with two rackmounted DIGITAL Servers (the servers, disks, rack and additional rack components must be obtained separately).*

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RA7000 Cluster Kit

Pedestal version: FR-CK700-UP
Rackmount version: FR-CK700-UR

The RA7000 Cluster Kit supports up to 24 SBBs, and provides dual redundant RAID controllers support, eliminating the RAID controller as a single point of failure. The RA7000 includes the StorageWorks HSZ70 controller, a 6-channel ultra-wide controller. Each channel is capable of supporting up to 14 drives, and expansion cabinet options are available for both the office enclosure and rackmount packaging that allows for disk expansion options up to 72 disks. The first RA7000 cabinet can be expanded with one or two expansion cabinets for a total of 48 or 72 disks. Using 9.1GB disks, the RA7000 provides 218GB of capacity in a single cabinet, 436GB with one expansion cabinet and 655GB fully expanded to three cabinets. The RA7000 supports RAID levels 0, 1, 0+1, and adaptive 3/5, as well as JBOD configurations. The RA7000 comes with 64 MB mirrored write-back cache, which is expandable to 128 MB. The RA7000 has five 180-watt power supplies, which are expandable to eight.

The RA7000 Cluster Kit does not include base clustering software (DCNT or NTS/E must be purchased separately).

The RA7000 Cluster Kits support both Intel-based and Alpha-based DIGITAL Servers.

FR-CK700-UP- RA7000 Pedestal DIGITAL Server Cluster Kit

Original Part Number	Qty	Description
DS-SWXRA-HC	1	RAID Array 7000 24 SBB Pedestal Storage Subsystem, Ultra SCSI pedestal subsystem
QB-5SBAE-SA	1	HSZ70 SOLN software NTI LIC/MCD and documentation
QB-5SBAD-SA	1	HSZ70 software NTA LIC/MCD and documentation
FR-PCTAZ-FB	2	Adaptec 2944UW Differential Ultra Wide SCSI controller
SWDKT-DD	1	Cluster Enabling Kit (Windows NT Alpha Cluster Documentation) **Includes:** 2 Y-cables, 1 differential SCSI cable, cluster installation and configuration documentation, 2 terminators, updated RAID management software and licenses
FR-DE500-BA	2	PCI to fast Ethernet 10/100 UTP adapter with DEC chip 21143
BN24Q-07	1	Crossover UTP cable (for private network)
QC-007AF-HC	1	Adaptec Alpha drivers and utility
QB-4QYAA-SA	1	ServerWORKS Manager 3.x

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FR-CK700-UR – RA7000 Rackmount DIGITAL Server Cluster Kit

Original Part Number	Qty	Description
DS-BA370-AA	1	RAID Array 7000 Rackmount enclosure
DS-HSZ70-AH	1	Ultra SCSI RAID controller with 64 MB cache
DS-HS35X-BC	1	Single Ethernet cache battery in SBB
70-33885-01	1	Rackmount kit *This kit replaces the rackmount kit that comes with the DS-BA370-AA as of June 1998.*
17-00083-49	1	US power cord
QB-5SBAE-SA	1	HSZ70 software NTI LIC/MCD and documentation
QB-5SBAD-SA	1	HSZ70 software NTA LIC/MCD and documentation
FR-PCTAZ-FB	2	Adaptec 2944UW Differential Ultra Wide SCSI controller
SWDKT-DD	1	Cluster Enabling Kit (Windows NT Alpha Cluster Documentation) **Includes:** 2 Y-cables, 1 differential SCSI cable, cluster installation and configuration documentation, 2 terminators, updated RAID management software and licenses
BN37A-05	1	SCSI shielded cable assembly
BN38E-0B	1	Cable assembly
FR-DE500-BA	2	PCI to fast Ethernet 10/100 UTP adapter with DEC chip 21143
BN24Q-07	1	Crossover UTP cable (for private network)
H8863-AA	1	Terminator, shielded with jack screws
QC-007AF-HC	1	Adaptec Alpha drivers and utility
QB-4QYAA-SA	1	ServerWORKS Manager 3.x

**Only needed for the older Rittal rack, which does not come with angle brackets.*

RA3000 Cluster Kit *(available today)*

Pedestal and Rackmount version: FR-CK300-UP

The RA3000 Cluster Kit supports the RA3000 Pedestal subsystem (DS-SWXRA-GA) with one controller, 120 V, blue. The RA3000 is a 7 slot pedestal for wide UltraSCSI disk SBBs, and includes 1 HSZ22 two channel controller with 16 MB cache, Environmental Monitoring Unit (EMU), two 204 watt power supplies with fans, 5M host SCSI cable (BN37A-05), BN38E-0B adapter, UPS serial cable, PC connection serial cable (DB-9f), one 120 Volt Un-interuptable power supply (UPS), and North American power cords. Disks are not included. The RA3000 requires the Solutions Software Kit for platform (included in the RA3000 Cluster Kit), host adapter (included in the RA3000 Cluster Kit), and disks. Options include a second HSZ22 controller, 7 disk SBB expansion pedestal, and cache memory upgrade.

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The RA3000 Cluster Kit supports the RA3000 disk drive shelf (DS-SWXRA-GN). The disk drive shelf contains a UltraSCSI, wide, straight buss device shelf (DS-BA356-JD or equivalent), a second 180 Watt power brick (DS-BA35X-HH), a one half meter UltraSCSI cable (BN37A-0E), plus power cords, mounting bracket and mounting hardware and documentation. The personality card of the disk shelf (DS-BA35X-FA, 70-33067-02) **must** be revision level H-1 or higher. A lower revision personality card will cause fault light to turn on when no fault is present.

Note: An RA3000 controller shelf (DS-SWXRA-GH/GK) cannot be configured from standard components. All components except the power bricks, UPS, and controller shelf mounting bracket are unique to RA3000.

The RA3000 Cluster Kit **does not include**:

- RA3000 storage enclosure; you must order this separately using part number:
  - Pedestal version: DS-SWXRA-GA
  - Rackmount version: DS-SWXRA-GN - includes the mounting kit for the RETMA, Digital and Compaq cabinets. If you want to use a metric cabinet, order the BA35X-RB mounting kit, too.
- Base clustering software (DCNT or NTS/E must be purchased separately).

Note: *The RA3000 Software Platform Kit only supports Intel-based DIGITAL Servers.*

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FR-CK300-UP- RA3000 DIGITAL Server Cluster Kit

Part Number	Qty	Description
QB-5TWAE-SA	1	Solutions Software Kit - Windows NT Intel/PCI **Includes**: StorageWorks Command Console, platform specific software, installation scripts, installation documentation
QB-5TWAD-SA	1	Solutions Software Kit - Windows NT Alpha *Support for Alpha-based DIGITAL Servers is available, but not certified with MSCS.* **Includes**: StorageWorks Command Console, platform specific software, installation scripts, installation documentation
SWDKT-DD	1	Cluster Enabling Kit (Windows NT Alpha Cluster Documentation) **Includes:** 2 Y-cables, 1 differential SCSI cable, cluster installation and configuration documentation, 2 terminators, updated RAID management software and licenses
FR-PCTAZ-FB	2	Adaptec 2944UW Differential Ultra Wide SCSI controller
FR-DE500-BA	2	PCI to Fast Ethernet 10/100 UTP adapter with DECCHIP 21143
BN24Q-07	1	Crossover UTP cable (for private network)
QB-4QYAA-SA	1	ServerWORKS Manager 3.x
QC-007AF-HC	1	Adaptec Alpha drivers and utility

- **Communication between the Servers and the External Storage Box**

  The communication between the two cluster nodes and the external storage box takes place via shared SCSI bus. DIGITAL Server Cluster Kits include two Adaptec 2944UW ultra wide SCSI adapters, which also support the non-ultra cabinets. Each kit contains two, 5M wide-differential SCSI cables to create these communication links. Also included are Y cables and a differential SCSI terminator for external termination of all elements on the SCSI bus. The Y cable allows for the easy removal and replacement of a failed server without affecting the uptime of the cluster and its users.

- **Private Network Connection between Cluster Nodes**

  Although the two cluster nodes can communicate over the LAN, a private network connection between the nodes is utilized for redundancy, allowing the cluster nodes to continue communications in the event of LAN failure. This removes the possibility of unnecessary failovers due to network problems. The DIGITAL Server Cluster Kits include two FR-DE500-BA 100/10Mbit PCI 10BaseT Ethernet controllers. A crossover twisted pair cable is also provided to complete the connection.

- **Software**

  DIGITAL Server Cluster Kits, which support both DCNT and MSCS, include the following software:

  DCNT

  DCNT v1.1 SP1 is included in the RA450 Cluster Kits only. DCNT v1.1 SP2 is now available for download on http://www.windows.digital.com.

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RAID Management software and firmware

The 450, 7000, and 3000 Cluster Kits also include the StorageWorks Command Console RAID management software, the HSZdisk drivers and the HSOF firmware necessary for the RAID controllers to support clustering.

ServerWORKS Manager

Each DIGITAL Server Cluster Kit includes ServerWORKS Manager, which provides management of the cluster components in the overall network management scheme. Although ServerWORKS Manager is also included with every DIGITAL Server, the inclusion of the most recent version of ServerWORKS Manager with the DIGITAL Server Cluster Kits ensures that installed base DIGITAL Servers are able to utilize the latest capabilities associated with cluster management.

Components NOT included in the DIGITAL Server Cluster Kits

The DIGITAL Server Cluster Kits do not include:

- **Base Clustering Software**

  The BA356, RA7000, and RA3000 Cluster Kits, which support both Intel-based and Alpha-based DIGITAL Servers, do not include base clustering software. (The RA450 Cluster Kits include DCNT.) However, both DCNT and MSCS are supported, through the following means:

  DCNT

  DCNT v1.1 SP2 can be purchased separately using part number QB-53V9A-SA. DCNT contains licenses for both server nodes, as well as unlimited client licenses. For more information on DCNT v1.1, see the *DIGITAL Clusters for Windows NT (DCNT)* section. DCNT requires Windows NT Server 4.0 Standard Edition for each node in the cluster, along with the appropriate number of client access licenses. Windows NT Server can be obtained with most DIGITAL Servers.

Note: *Any database or application software that will be included in a failover group must be loaded on the hard disk of each server. The customer is under obligation to comply with the appropriate license terms.*

  MSCS

  NTS/E, which includes MSCS, must be purchased separately for each server node.

- **Windows NT Server/Enterprise (including Microsoft Cluster Server) or Windows NT Server 4.0**

  Microsoft Cluster Server is only sold as part of NTS/E. For each server in the cluster, NTS/E must be obtained from any standard Microsoft Windows NT distribution channel. Compaq offers an upgrade package for existing DCNT customers to MSCS (QB-5Z5AA-WA), which includes:

  - NTS/EE for each server at a reduced license fee
  - Migration Wizard to retain DCNT administrative settings
  - 4 hours of service

- **Servers**

  The DIGITAL Servers used in the cluster may be existing DIGITAL XL, MX, HX or ZX Pentium Pro / Pentium II servers or AlphaServers 800, 1200, or 4100 servers, or newly purchased DIGITAL Server 1000, 3000, 5000, or 7000 series (Intel-based or Alpha-based DIGITAL Servers). Because the

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DCNT solution allows for dual active server operation, it is recommended that both servers be capable of handling the combined workloads of the two servers, as would occur during a failover operation. This should be taken into account when determining which servers are clustered together. For example, a DIGITAL Server 1200 handling file/print services should not be paired with a DIGITAL Server 7100 database server, handling near-capacity workloads.

Each server must have at least one internal hard disk. This disk is required for the installation of the operating system, cluster, and application software. However, this disk is not part of the shared storage, so it cannot be failed over.

Neither DCNT nor MSCS support mixed architecture (Intel and Alpha) in the same cluster.

For a list of supported hardware for DCNT, see the *Supported DCNT Hardware* section.

For a list of supported hardware for MSCS, go to:

http://www.microsoft.com/hwtest

For the latest information on the status of our **Microsoft Cluster Server qualification and certification efforts**, go to:

http://akin40.mro.dec.com/clusters/DSClusterKits.htm

- **Disk Drives**

  Drives must be ordered separately.

Note: *The drives for the DIGITAL Servers and the DIGITAL Server Cluster Kits are different. The drives differ in capacity, geometry and firmware levels, and are not interchangeable. These drives are not supported in the system or in the BA356 stand-alone. They are supported in all Cluster Kits (including the BA356 Cluster Kit). They are not supported anywhere connected to the FR-PCTAR (Mylex) controllers.*

For DIGITAL Server Cluster Kits, supported drives include:

Part Number	Capacity	Notes
FR- or DS-RZ1BB-VW	2.1GB at 7200 rpm Ultra Wide SCSI drive SBB	Will be available through December 1998, no replacement
FR- or DS-RZ1CB-VW	4.29GB at 7200 rpm Ultra Wide SCSI drive SBB	Will be available through September 1998, replaced by DS-RZ1CF-VW
FR- or DS-RZ1CD-VW	4GB at 10000 rpm Ultra Wide SCSI drive SBB	
FR-RZ1DB-VW or DS-RZ1DF-VW	9.1GB at 7200 rpm Ultra Wide SCSI drive SBB	DS-RZ1DF-VW replaced DS-RZ1DB-VW
DS-RZ1EF-VA	18.2 GB at 7200 rpm Fast Narrow	Supported on the RA450, RA7000, and RA3000
DS-RZ1EF-VW	18.2 GB at 7200 rpm Ultra SCSI	Supported on the RA450, RA7000, and RA3000

- **LAN Network Connection**

  For the cluster to provide services to its clients, both servers and clients must be on a LAN. These guidelines assume that the components required for this are already in place, for example Network

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Interface Cards (NIC) and cabling. DCNT supports NetBEUI, TCP/IP, and IPX/SPX network protocols. MSCS supports the TCP/IP network protocol.

- **Storage Options**

  A variety of options are available for the StorageWorks RAID Arrays. For example, the RA450 supports a redundant HSZ50 controller, which requires additional controller software, optional cache battery packaging, additional power supplies, and spare EMUs. These options must be purchased separately. The only exceptions are the required rackmount mounting options, which are included in the rackmount kits.

  For information on storage options, see www.storage.digital.com or the *RAID Options* or *Order Worksheet* sections.

Expansion Cabinets

Additional storage capacity can be added to the same SCSI bus through the expansion cabinets listed in the following table. Please note the requirements.

Storage	Original Part Number	Description
BA356 pedestal	FR-BA356-PA	BA356 Pedestal Expansion Cabinet The FR-BA356-PA is already configured with dual channel Personality Module and the terminator (BA35X-ME) for a split bus configuration. There is another jumper (BA35X-MF) for those that want to go back to a single bus. **Requires**: another cabinet, a VHDCI to VHDCI cable (BN38C-nn) of the appropriate length (Compaq offers 2M and 5M), and a tri-link connector (H8861-AA) from StorageWorks, a BA356 Pedestal Cluster Kit (FR-CK356-UP)
BA356 rackmount	FR-BA356-PD	BA356 Rackmount Expansion Cabinet Requires another cabinet, a VHDCI to VHDCI cable (BN38C-nn) of the appropriate length (Compaq offers 2M and 5M), and a tri-link connector (H8861-AA) from StorageWorks **Requires**: BA356 Rackmount Cluster Kit (FR-CK356-UR)
RA7000 pedestal	DS-SWXRA-HB	RA7000 Pedestal Disk Expansion Cabinet **Includes**: 24 additional disk slots, 5 power supplies, redundant cooling, EMU & PVA, power cable **Requires**: one DS-BNK37-1E expansion cable kit, RA7000 Pedestal Cluster Kit (FR-CK700-UP)
RA7000 rackmount	DS-BA370-AA	RA7000 Rackmount Disk Expansion Cabinet **Includes**: 24 additional disk slots, 5 power supplies, redundant cooling, EMU & PVA, power cable **Requires**: one DS-BNK37-1E expansion cable kit, RA7000 Rackmount Cluster Kit (FR-CK700-UR)
RA3000 pedestal	DS-SWXRA-GD	RA3000 Expansion pedestal **Includes**: 120/240 V, with space for an additional 7 Ultra-SCSI disk

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		drives, expansion SCSI cable

RAID Options

The following sections describe RAID Array options.

RA450 Options

You can order the following options for the RA450:

Part Number	Description
FR-HSZ50-AF	RA450/HSZ50 controller for redundant controller operation **Includes:** RA450 6 channel controller, tri-link with terminator, 32MB write back cache expandable to 64MB or 128MB, single cache battery in SBB with cable, serial line cable assembly with adapters (9 pin and 25 pin) **Requires:** Second Platform Software Kit (QB-5JCAA-SA), cache counts must be the same on each storage controller
FR-HSSIM-AA	32MB cache module for RA450/HSZ50 controller Use 1 module to expand cache to 64MB or 3 modules to expand to 128MB per controller **Requires**: Redundant controllers require equal amounts of cache.
FR-SWXBP-SD	Shelf power supply for RA450 Up to 8 150W universal supplies in a RA450 pedestal or rackmount. N+1 redundancy requires 5 supplies, which ship standard with the product. May add up to 3 additional supplies for redundancy
FR-HS35X-BA	Single cache battery **Includes**: One battery in an SBB
FR-HS35X-BB	Dual cache battery
FR-SWXBF-AA	Dual speed fan kit, included in RA450 pedestal and rack (not required – used only as cold spare)
FR-SWXBE-AA	Environmental Monitor Unit for RA450, included in RA450 pedestal and rack (not required – used only as cold spare)

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RA7000 Options

You can order the following options for the RA7000:

Part Number	Description
DS-HSZ70-AH	Redundant HSZ70 Controller for dual controllers in DS-SWXRA-HC **Includes**: 64MB cache **Requires:** DS-HS35X-BC Battery and HSZ70 Solution Software
DS-HS35X-BC	Single external cache battery **Includes**: one battery in a single SBB
DS-HSSIM-AB	64MB Controller Cache Memory Adds up to 64MB to each controller **Requires**: redundant controllers require equal amounts of cache
DS-SWXRA-HB	Pedestal Disk Expansion Cabinet **Includes**: 24 additional disk slots, 5 power supplies, redundant cooling, EMU & PVA, power cable **Requires**: one DS-BNK37-1E expansion cable kit
DS-BA370-AA	Rackmount Disk Expansion Cabinet **Includes**: 24 additional disk slots, 5 power supplies, redundant cooling, EMU & PVA, power cable **Requires**: one DS-BNK37-1E expansion cable kit
DS-BNK37-1E	Expansion Cable kit Order one with each expansion cabinet
DS-BA35X-HH	180 Watt Power supplies **Requires**: Requires one DS-BA35X-HE power control unit for added power For fully redundant power, order three additional power supplies
DS-BA35X-HE	Power control unit **Requires**: one additional when you have more then 5 180Watt power supplies.
DS-HS35X-BD	Dual replacement external cache battery
DS-BA35X-MK	Dual speed fan kit
DS-BA35X-EB	Environmental Monitor Unit (EMU)
DS-BA35X-EC	Power Verification and Addressing (PVA)

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RA3000 Options

You can order the following options for the RA3000:

Part Number	Description
DS-HSZ22-AA *Available Q3 CY 1998*	Redundant HSZ22 Controller for dual controllers in DS-SWXRA-HC **Includes**: 16MB cache and two 16MB SIMMs for mirror cache, one BN37A-05 5 meter Ultra-SCSI cable, on eBN38E-OB adapter **Note**: Only one platform kit is required per controller pair
DS-HSZ22-AB *Available Q3 CY 1998*	Second HSZ22 controller with two 32Mbytes **Includes**: SIMMs for cache and two 32 Mbyte SIMMs for mirror cache, one BN37A 05 5-meter UltraSCSI cable, one BN38E-0B adapter **Note**: Only one platform kit is required per controller pair
DS-SWXRA-GD	Expansion pedestal **Includes**: 120/240 V, with space for an additional 7 Ultra-SCSI disk drives, expansion SCSI cable

Cluster Contacts

If you have questions, please contact:

Adrianna Swartout for technical issues (Alpha BIOS, Adaptec drivers and BIOS), new Alpha server qualifications, DCNT qualifications
Andy Kozak or **Bill Landers** for Alpha-based DIGITAL Servers
Antbony Schultze for DIGITAL Server options
Jeffrey James for RA3000
Angela Pitter for BA356
Bill Page for RA7000, RA7000FC, RA8000FC
Mark Hopewell for MSCS certifications on ProLiant servers, 7100, 7300
Mark Nagaitis for Intel based NT clusters
Vince Gayman for High Availability marketing
Dan Cox for emerging NT cluster solutions

Ready-to-Go Clusters

Ready-to-Go Clusters from Custom Systems (CS) customizes the cluster installation and configuration process by providing customers with a complete, ready-to-go cluster. These clusters are shipped completely preinstalled, preconfigured, and pretested.

Custom Systems also provides fully configured NT clusters, with either NT4.0 and DCNT or NTSEE pre-installed.

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Ready-to-Go Cluster Components

Although there are several Ready-to-Go Cluster configurations available, the following example lists the components of the Ready-to-Go Cluster using the 7305.

The DIGITAL Server 7305HA is a H9A10 white cabinet 1.70m high (34U) dual AC-In Power Distribution Unit containing:

- Two 7305R DIGITAL Servers each with:
  - One 64-bit Alpha EV5.6 533Mhz with 4MB cache
  - Integrated S3 Trio SVGA graphic controller with 1MB VRAM
  - One CDROM drive
  - One 1.44MB Diskette drive
  - One 4.3GB UltraWide SCSI disk
  - One 100Mb/s Ethernet Adapter for Cluster communication
  - One 100Mb/s Ethernet Adapter for LAN Network Connection
  - One two-channel UltraWide SCSI Single Ended adapter
  - One one-channel UltraWide SCSI Differential adapter
  - One 128MB ECC EDO RAM option (4 x 32MB DIMM)
  - Two 450W power supply
- One RA7000 RAID Array with:
  - One HSZ70 controller with 64MB cache and 24 SBB Slots
  - Two AC-In modules
  - One Environment Module
  - Eight 180W power supplies
  - One 4.3GB UltraWide SCSI disk

Components NOT included in the Ready-to-Go Clusters

The following components are not included in the Ready-to-Go Clusters:

- **Tape drives**

  Tapes drives must be ordered separately.

- **Servers disk drives**

  Servers contain only one 4GB drive. Additional drives must be ordered separately.

- **RAID Subsystem disk drives**

  RAID Subsystem contains only one 4.3GB drive. Additional drives must be ordered separately.

Note: *The drives for servers and RAID subsystems are different.*

You can also order Ready-to-Go Clusters with the following options:

- Console Switch
- Additional Shelves
- Additional Raid Shelves

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Ordering Ready-to-Go Clusters

You can order the DIGITAL Server 7305HA with either:

- Microsoft NT 4.0 and DCNT: C*-NAEKN-1** (No country kit)
- Microsoft Enterprise Edition : C*-NBEKN-1** and Country Kit 2*-CK004-AA/AP/AG/AS/AJ

Ready-to-Go Clusters Contacts

If you have questions about Ready-to-Go Clusters, please contact:

Product Manager:	Ernie Crocker	DTN: 264-3992, (603) 884-3992
Marketing Manager:	Mary Lee	DTN: 264-4995, (603) 884-4995
Sales Manager:	Alan Padula	DTN: 264-3709, (603) 884-3709

Multivendor Customer Services for Windows NT and Windows NT Clusters

Whether your customers are implementing Windows NT servers and clusters at the same time, or adding clustering capabilities to their existing Windows NT domains, Installation and Startup Services are tailored to meet their needs.

Windows NT Installation and Startup packages are modular by design, so you can choose the level of work that is right for your customer's environment -- no matter how simple or complex. The complete Base Service Package includes Windows NT Server software installation and protocol installation, as well as the creation of user accounts and the integration of PC clients, plus initial printer and fileshare setup. If your customers prefer, they can purchase varying components of this Base Service Package. Additional startup services, such as domain creation, NetWare Environment Resource Server or RAS Server configuration, are also available to support more complex installations.

Windows NT Base Service Package is designed to support the most frequently required installation and startup services for the straightforward installation of Windows NT Server software. In two days or less, your Windows NT Server operating system will be setup and ready to communicate with essential networks, printers, and clients. Base Service Package components include:

- *Windows NT Server Operating System Install* - Windows NT specialists will install the operating system and configure up to three network protocols from the Windows NT default protocol set -- NetBEUI, IPX/SPX, and TCP/IP.
- *Windows NT Server Account Creation* - This component supports the creation of ten accounts and user profiles as well as the creation of Home directories, plus the configuration of account policies for those accounts.
- *Windows NT Server Client Configuration* - You can have up to five previously-networked PC clients configured into your customer's Windows NT Server environment. Client accounts are created on the server and necessary protocols are configured. Plus, a single server-based fileshare is mapped to the clients, with the addition of access to a single server-based printer.
- *Windows NT Server Local Printer Installation* - One local printer on Microsoft's Windows NT Hardware Compatibility List will be integrated with your customer's server. Drivers for other platforms are installed on the server to enable access to the locally connected printer. Text page print outs and client access verification services are also provided.

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- *Windows NT Server Fileshare Creation* - This service component includes the formatting and partitioning of one previously-installed 9.0 or less GB disk drive, plus the creation and setup of one fileshare on the local disk, which is physically installed in the server. Then up to five previously networked PC clients are configured by mapping them to the new server-based fileshare.

For more information on Installation and Startup Services for Windows NT Clusters, go to:

Internal Web Link: http://mcsd1.zko.dec.com/csp/packs/Clusters/clusters.htm
External Web Link: http://www.digital.com/services/nsis/nt_clusters.htm

Other service plans include:

- **Priority Service Plan**

  The Priority Service Plan (also known as Point of Product Sales (POPS) Service) is an industry leading approach to quoting support services. Our direct and indirect sales channels can now perform a single table look-up and provide your customers with one service part number and price for a complete configuration. Using the One-Step Quoting Table, the service price is determined by the total value of the product order, regardless of the number of products ordered. Compaq is outpacing the competition, which continues to price system services by individual product items.

  For more information on the Priority Service Plan for Windows NT, go to:

  Internal Web Link: http://www-amcs.shr.dec.com/mkt/pops.htm

- **Business Critical Services**

  If your customers manage a large enterprise, they depend on complex, critical systems for daily operations and profitability—even survival. Compaq brings together the people, technology, and global infrastructure your customers need to keep their Windows NT environment performing at its best. We combine highly responsive support with proactive, environment-wide services that eliminate problems that cause downtime. Our flexible plans can give your customer:

  – Crisis response as fast as 15 minutes
  – Dedicated technical account manager and support team
  – Proactive monitoring services that correct problems before your customer knows they exist
  – Remote system diagnosis and upgrades

  For more information on Business Critical Services for Windows NT, go to:

  Internal Web Link: http://www-amcs.shr.dec.com/mkt/nt_techn.htm
  External Web Link: http://www.digital.com/services/mcs/mcs_critical.htm

- **Bronze Support for Windows NT**

  Bronze Software Support for Microsoft Windows NT is designed to help your customer maintain high system availability and top software performance in your non-critical Windows NT software environment.

  The service offers telephone access to Product Specialists during regular business hours (8 a.m. to 5 p.m., Monday-Friday, customer local time) for expert assistance in problem diagnosis and resolution. It also includes around-the-clock electronic access to symptom/solution databases.

  As a result, help in such areas as system management upgrades, new features, and known problems, plus valuable operational advice, is only a call or a few keystrokes away - not just for Windows NT, but for the full range of popular software for client/server environments, including Microsoft BackOffice.

  For more information on Bronze Support for Windows NT, go to:

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Internal Web Link: http://www-amcs.shr.dec.com/mkt/Svc_bronze.html
External Web Link: http://www.digital.com/services/mcs/mcs_sntbronze.htm

- **Bronze Software Support for Microsoft Windows NT**

  Bronze Software Support for Microsoft Windows NT makes a positive impact on your customer's business operations and systems investments by maximizing your customer's overall software performance and availability. Its features include:

  – Toll-free telephone advisory and remedial support from the Customer Support Center during normal business hours

  – Problem identification and resolution, usage advice on proper software execution, information on the interpretation of software product technical documentation, and answers to specific questions about initial installation and deployment of software

  – Electronic Access to symptom/solution databases through the Internet or electronic access tools

  – Multivendor Support for a full range of products.

- **Silver Support for Windows NT**

  If your customers' client/server environment is complex, has an active and demanding user base, or is consistently being asked to enhance its performance and availability, Silver Support for Windows NT is designed specifically for them.

  The service goes beyond our basic software support to provide faster access to enhanced support, delivered by experts on the Silver Team and managed by an assigned technical support specialist familiar with your customer's operations. Your customer receives proactive support, including information about newly released patches as soon as it becomes available from the product vendor. It all adds up to enhanced support for today's demanding environments.

  Silver Support for Windows NT starts with all the features and benefits of our Bronze Software Support, but takes support capabilities farther with:

  – A Technical Account Manager assigned to serve as your customer's single point of contact for critical problems, monitor your customer's service request activity, make sure problems are resolved to your customer's satisfaction, and work closely with your customers in support of their business goals.

  – Access to a Dedicated Silver Support Team during normal business hours, when your customers need it the most

  – One-hour callbacks during business hours

  – 24x7 coverage from product specialists at the Customer Support Center

  – Proactive software support, including information on newly released patches and updates.

  – Multivendor support that covers the full range of products on the Supported Products List

  – Quarterly site reviews scheduled by your customer's Technical Account Manager to review significant patterns in service requests or technical problems

  – System Healthcheck to identify performance or security issues.

  For more information on Silver Support for Windows NT, go to:

  Internal Web Link: http://www-amcs.shr.dec.com/mkt/Svc_silver.html
  External Web Link: http://www.digital.com/services/mcs/mcs_sntsilver.htm

- **Gold Support for Windows NT**

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Gold Support for Windows NT provides the highest levels of responsiveness and problem-resolution capabilities, designed specifically for business-critical environments.

This service increases responsiveness and expedites problem resolution by routing critical service requests directly to a dedicated Gold Support Team and ensuring comprehensive problem management by a high-level, named Technical Account Manager. The team is available around the clock to give your customer's critical calls the highest priority within the Customer Support Center (CSC), providing continuous effort until the problem is resolved. The service also features electronic access to resources and proactive software support.

It includes all of the features of Silver Support for Windows NT and adds highly personalized services, including:

- A named Technical Account Manager who serves as your customer's single point of contact at our Customer Support Center and oversees technical support
- A dedicated Gold Support Team staffed by Microsoft-trained and certified specialists to provide top-priority response for your customer's critical calls around the clock
- Callbacks within 30 minutes for critical calls, plus continuous effort
- Electronic access for submitting routine or non-critical service requests, exchanging files, searching the software product databases, and receiving software patches
- Proactive software support, including information on newly released patches and updates, plus upgrade impact planning
- Multivendor support that covers the full range of products on the Supported Products List
- System Healthcheck to identify performance or security issues.

Compaq offers additional services that complement Gold Support and help create a comprehensive support solution for Windows NT environments.

- **System Management Support** provides the services of a specialist to complement System Healthcheck service.
- **On-Site/Per Event Services** provides access to over 1,500 Microsoft Certified Systems Engineers (MCSEs) to address difficult or specialized challenges.
- **Installation & Start-Up** provides most of the basic installation and start-up work for Windows NT environments.

For more information on Gold Support for Windows NT, go to:

Internal Web Link: http://www-amcs.shr.dec.com/mkt/Svc_gold.html
External Web Link: http://www.digital.com/services/mcs/mcs_sntgold.htm

- **System Health Check for Windows NT**

System Healthcheck is the quickest, most cost-effective way to identify security and performance problems -- before they affect your customer's critical business operations.

Advanced, expert system-based tools are used to collect information on your customer's system or LAN configuration. The collected data is analyzed against accepted practices, and the findings -- together with recommendations for corrective action -- are documented in a summary report. A technical specialist reviews and discusses these findings with your customer.

For more information on System Health Check for Windows NT, go to:

External Web Link: http://www.digital.com/info/services/mcs/mcs_srvhcheck.htm

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- **System Management Services for Windows NT**

  A dedicated Program Manager is your customer's single point of contact, and provides the following services:

  – Coordinates vendor service agreements

  – Routes troubleshooting calls

  – Coordinates training, upgrades, and billing

  – Plans ongoing, cost-effective service solutions

  – Qualifies all vendors to stringent quality, skill, and performance standards

  – Negotiates the most favorable service agreements

  – Selects multiple service partners to assure availability

  For more information on System Management Services for Windows NT, go to:

  External Web Link: http://www.digital.com/info/services/mcs/mcs_srvsmsuppt.htm

- **Software Support for Windows NT**

  Software Support Service provides full support for your customer's Windows NT operating system. Round-the-clock telephone and electronic access to skilled software product specialists and comprehensive software product databases help your customer's technical staff resolve software issues and carry out unfamiliar procedures. In addition, your customers are licensed for new versions of software to help them stay technologically current – including Year 2000 versions of software.

  Software Node Service offers a cost-effective alternative for systems where direct telephone support is not required. This service also provides the right to use new versions of operating system software. When purchased in conjunction with Software Support Service, Software Node Service extends electronic and telephone assistance to nodes in a cluster or network.

  Layered Product Support provides the right to use new versions of layered software and extends to your customers' layered products the level of support purchased for their Windows NT operating system. Layered Product Support must be purchased as part of your customer's software support agreement.

  For more information on Software Support for Windows NT, go to:

  External Web Link: http://www.digital.com/info/services/mcs/mcs_support.htm

MSCS Certified Configurations

Microsoft requires that vendors run a self-certification test suite (Hardware Compatibility Test or HCT) to certify specific hardware configurations in support of MSCS. A configuration consists of:

- Two server nodes (single processor and SMP configurations are considered different servers)
- Host-based SCSI or Fibre Channel adapters (attached to the external storage on a multi-initiated bus)
- External RAID array or host-based RAID adapters

For more information on MSCS certifications, go to:

http://www.microsoft.com/ntserverenterprise/support/clusterfaq_hardware.asp.

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For the official Microsoft Hardware Compatibility List, go to:

http://www.microsoft.com/hwtest

Select **Cluster** in the first entry field; **DIGITAL Equipment Corp.** in the second entry field.

For the latest information on the status of our Microsoft Cluster Server qualification and certification efforts, go to:

http://akin40.mro.dec.com

Select **Clusters**, select **DIGITAL Server Cluster Kits**, and then select **MSCS Qualification and Certification Schedule.**

Note: *You may see configurations on the MSCS Qualification and Certification Schedule that are not on Microsoft's Hardware Compatibility List. Keep in mind that it does take a few weeks for the logs to be approved and the configurations to appear on Microsoft's Hardware Compatibility List.*

MSCS Certifications

Note: *As of September 1998, the group doing MSCS certifications on DIGITAL Servers has been redirected to other work. Please contact Mark Hopewell with any MSCS certification questions.*

The following hardware configurations have been certified for use with MSCS, as of October 27, 1998:

DIGITAL Server Model	CPU QTY	Storage Controller	Expansion Storage	Network Controller	Name on Microsoft's HCL
1200	SMP	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 1200(1P)/RA310u
3100	1	2944W	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 3100(1P)/RA310
3100	SMP	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 3100/RA310u
3100	SMP	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 3100/RA3000u
3200	SMP	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 3200/RA310u
3200	SMP	2944W	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 3200/RA310
3200	1	2944W	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 3200(1P)/RA310
3200	SMP	2944UW	RA450	FR-DE500-BA	DIGITAL Server Cluster Model 3200/RA450u
3200	SMP	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 3200/RA7000u
3200	SMP	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 3200/RA3000u
3300	1	KZPSA	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 3300(1P)/RA310
3300	1	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 3300(1P)/RA310u
3300	1	2944UW	RA450	FR-DE500-BA	DIGITAL Server Cluster Model 3300(1P)/RA450u
3300	1	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 3300(1P)/RA7000u
3300	1	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 3300(1P)/RA3000u
5100	SMP	2944W	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 5100/RA310
5100	SMP	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 5100/RA310u
5100	SMP	2944UW	RA450	FR-DE500-BA	DIGITAL Server Cluster Model 5100/RA450u
5100	SMP	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 5100/RA3000u

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5100	SMP	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 5100/RA7000u
5100	SMP	N/A	RA7000FC	Emulex Hub	DIGITAL Server Cluster Model 5100/RA7000 Fibre Channel
5200	1	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 5200(1P)/RA310u
5200	SMP	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 5200/RA310u
5200	SMP	2944UW	RA450	FR-DE500-BA	DIGITAL Server Cluster Model 5200/RA450u
5200	SMP	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 5200/RA7000u
5200	SMP	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 5100/RA3000u
5200	SMP	N/A	RA7000FC	Emulex Hub	DIGITAL Server Cluster Model 5200/RA7000 Fibre Channel
5300	1	KZPSA	RA450	FR-DE500-BA	DIGITAL Server Cluster Model AS1200(1P)/RA450
5300	SMP	2944UW	RA450	FR-DE500-BA	DIGITAL Server Cluster Model 5300/RA450u
5300	SMP	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 5300/RA7000u
5300	SMP	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 5300/RA3000u
5300	1	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 5300(1P)/RA3000u
7100	SMP	2944W	RA310	DE450-CA	DEC PZX6000/RA310
7100	SMP	2944UW	RA310	FR-DE500-BA	DIGITAL Server Cluster Model 7100/RA310u
7100	SMP	2944UW	RA450	DE450-CA	DIGITAL Server Cluster Model 7100/RA450u
7100	SMP	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 7100/RA3000u
7100	SMP	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 7100/ StorageWorks RAID 7000
7100	SMP	2944UW	ESA10000	FR-DE500-BA	DIGITAL Server 7100/StorageWorks ESA 100000
7300/ AlphaServer 4100	SMP	KZPSA	RA310	FR-DE500-BA	DIGITAL Server Cluster Model AlphaServer 4100/StorageWorks RAID 310
7300/ AlphaServer 4100	SMP	KZPSA	RA450	FR-DE500-BA	DEC AS4100/RA450
7300/ AlphaServer 4100		KZPBA	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model AlphaServer 4100/StorageWorks RAID 7000 24 Disk Array
7300	SMP	2944UW	RA450	FR-DE500-BA	DIGITAL Server Cluster Model 7300/RA450u
7300	1	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 7300(1P)/RA3000u
7300	SMP	2944UW	RA3000	FR-DE500-BA	DIGITAL Server Cluster Model 7300/RA3000u
7300	1	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 7300(1P)/RA7000u
7300	SMP	2944UW	RA7000	FR-DE500-BA	DIGITAL Server Cluster Model 7300/RA7000

Ordering DIGITAL Hardware/Software for a NT Cluster

Note: *For DCNT, use the part numbers provided in this section and in the most current Product Handbook to order the components required for a NT cluster.*

Step 1 Order two DIGITAL Servers.

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Note: *You can use the Product Handbook or ServerMaker to generate a parts list.*

Although you can mix two different servers of the same architecture (for example, two different Intel-based servers), Compaq recommends that you use two identical servers of the same architecture.

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DIGITAL Servers

Feature	12xx	31xx	32xx	33xx	51xx	52xx	53xx
ECC Memory	Yes		Yes	Yes	Yes	Yes	Yes
Hot swap bays		Yes	Yes	Yes	Yes	Yes	Yes
Multi-channel RAID		Yes	Yes	Yes	Yes	Yes	Yes
Redundant cooling fan					Yes	Yes	
Dual power supply							Yes
Redundant power supply					Yes	Yes	
Rackable	Yes	Yes	Yes	Yes	No	No	No
MSCS support	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DCNT support	Yes	Yes	Yes	Yes	Yes	Yes	Yes
versions, CPU/cache **II – Pentium II** **Pro – Pentium Pro**	1200 II 6233/512 1205 II 266/512 1210 II 300/512 1200R II 266/512 1205R II 333/512	3100 Pro 6200/256 3105 Pro 6200/512 3105R Pro 6200/512	3200 II 6266/512 3205 II 300/512 3210 II 333/512 3215 II 350/512 3200R II 6266/512 3205R II 6300/512 3210R II 333/512 3215R II 6350/512	3300 EV5/400 3305 EV5/500 3300R EV5/400 3305R EV5/500	5100 Pro 6200/256 5105 Pro 6200/512	5200 II 6266/512 5205 II 300/512 5210 II 333/512 5215 II 400/512	5300 EV5/ 5305 EV5/
I/O Slots	7	7	7	6	11	11	6
Maximum internal storage	45GB	72GB	72GB	72GB	126GB	126GB	126GB
Maximum memory	512MB EDO ECC DIMM	II – 512MB DIMM Pro – 1GB SIMM	II – 512MB DIMM Pro – 1GB SIMM	2GB EDO ECC DIMM	Pro – 1GB SIMM II – 512MB DIMM	Pro – 1GB SIMM II – 512MB DIMM	2GB SDR/ DIMM EC
Power	300W	300W	300W	350W	450W	450W	450W (2)
CD-ROM	12x SCSI	12x SCSI	12x SCSI	12x SCSI	12x SCSI	12x SCSI	12x SCSI
RAID option	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hard disk drive interface	Integrated single Ultra Wide SCSI	Integrated single Ultra-Wide SCSI	Integrated single Ultra-Wide SCSI	Integrated single Ultra Wide SCSI	Integrated PCI Fast Ethernet	Integrated PCI Fast Ethernet	Ultra-Wide

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If you plan to use an existing server, check the following tables to make sure that it is supported. Pair any existing server with a new server capable of handling the workload of both servers. It is recommended that both servers provide the same basic performance capabilities (for example, purchase a second 5100 to pair with an existing 5100). Two identical servers provide for optimal performance in the event of failover, although Compaq will support non-identical Alpha-based or Intel-based DIGITAL Servers (*mixed server architecture clusters are not supported*). Make sure that each server has sufficient internal storage for operating system, cluster and application software.

Intel-based Servers:

DIGITAL Server	CPU version	Min. BIOS rev.	Min. SCU Rev.
1xxx series	590	2.06	1.10e
	5100, 5100DP	2.06	1.10e
	5133, 5133DP	2.06	1.10e
	5166, 5166DP	2.06	1.10e
	5200, 5200DP	2.06	1.10e
	6200	1.02	1.03
31xx series	6200, 6200MP/2	2.06	1.10e
32xx series		1.10	1.01.01
33xx series		1.10	AlphaBIOS V5.64
51xx & 52xx series	590, 590MP/2	1.10	1.08e
	5133, 5133MP/2	1.10	1.08e
	5166, 5166MP/2	1.10	1.08e
	6200, 6200MP/2	1.00	N/A
53xx series		1.10	AlphaBIOS V5.65
7000 series	5133MP, MP/2, MP4	1.00.07 BGO	3.30
	5166MP, MP/2, MP/4	1.00.07 BGO	3.30
	6166MP, MP/2, MP/4	1.03	1.03
	6200MP, MP/2, MP4	1.03	1.03
73xx series		1.10	AlphaBIOS V5.65

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Alpha-hased Servers:

Supported with DCNT or MSCS

Platform	CPU version	Alpha BIOS for DCNT
3300	400	5.64
3305	500	5.64
5300	400	5.65
5305	533	5.65
7300	400	5.65
7305	533	5.65

AlphaServers (Universal Platforms)

Supported with DCNT

Platform	CPU version	Alpha BIOS
800	333	5.64
	400	5.64
	500	5.64
1000/1000a	266	Check with your sales representative
	333	Check with your sales representative
	400	Check with your sales representative
	500	Check with your sales representative
1200	400	5.65
	466	5.65
	533	5.65
4100	400	5.65
	466	5.65
	533	5.65

If your server is listed, but you do not have the proper BIOS version, download the appropriate version from www.pc.digital.com or by dialing into the bulletin board at 508-496-8800.

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QTY	Intel-based DIGITAL Servers
	DIGITAL Server 1200, 1205, 1210
	DIGITAL Server 3100, 3105
	DIGITAL Server 3200, 3205, 3210, 3220, 3225
	DIGITAL Server 5100, 5105
	DIGITAL Server 5200, 5205, 5210, 5220, 5225
	DIGITAL Server 7100, 7105

QTY	Alpha-based DIGITAL Servers
	DIGITAL Server 3300, 3305
	DIGITAL Server 5300, 5305
	DIGITAL Server 7300, 7305, 7310

Step 2 Order one of the DIGITAL Server Cluster Kits.

QTY	Part Number	Description
	FR-CK356-UP	BA356 Ultra Cluster Kit (Pedestal) for Intel or Alpha DIGITAL Servers
	FR-CK356-UR	BA356 Ultra Cluster Kit (Rackmount) for Intel or Alpha DIGITAL Servers
	FR-CK450-RP	RA450 Cluster Kit (Pedestal) for Intel only
	FR-CK450-RR	RA450 Cluster Kit (Rackmount) for Intel only
	FR-CK700-UP	RA7000 Ultra Cluster Kit (Pedestal) for Intel or Alpha DIGITAL Servers
	FR-CK700-UP	RA7000 Ultra Cluster Kit (Pedestal) for Intel or Alpha DIGITAL Servers
	FR-CK300-UP	RA3000 Cluster Kit (Pedestal/Rackmount) for Intel or Alpha[1] DIGITAL Servers

Step 3 To daisy-chain a second external storage cabinet, order the following kit *in addition* to the DIGITAL Server Cluster Kit.

QTY	Part Number	Description
	FR-BA356-PA	BA356 Pedestal Expansion Cabinet The FR-BA356-PA is already configured with dual channel Personality Module and the terminator (BA35X-ME) for a split bus configuration. There is another jumper (BA35X-MF) for those that want to go back to a single bus. **Requires**: another cabinet, a VHDCI to VHDCI cable (BN38C-nn) of the appropriate length (Compaq offers 2M and 5M), and a tri-link connector (H8861-AA) from StorageWorks, a BA356 Pedestal Cluster Kit (FR-CK356-UP)
	FR-BA356-PD	BA356 Rackmount Expansion Cabinet **Requires**: another cabinet, a VHDCI to VHDCI cable (BN38C-nn) of the appropriate length (Compaq offers 2M and 5M), and a tri-link connector (H8861-AA) from StorageWorks

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	DS-SWXRA-HB	RA7000 Pedestal Disk Expansion Cabinet **Requires**: Expansion Cable Kit (DS-SWXRA-HB) for each Disk Expansion Cabinet
	DS-BA370-AA	RA7000 Rackmount Disk Expansion Cabinet **Requires**: Expansion Cable Kit (DS-SWXRA-HB) for each Disk Expansion Cabinet
	DS-SWXRA-GD	RA3000 Disk Expansion Cabinet **Includes**: 120/240 V, with space for an additional 7 Ultra-SCSI disk drives, expansion SCSI cable **Requires**: another Software Platform Kit

Step 4 Order Storage Building Blocks (SBB) for the storage and/or expansion cabinets.

The following table compares the 9GB and 18GB disk drives:

Model number	DS-RZ1EF-VA[1]	DS-RZ40-VA	DS-RZ1EF-VW[1]	DS-RZ1DF-VW FR-RZ1DB-VW
Capacity (GB)	18.2	9.1	18.2	9.1
Interface	Fast SCSI-2	Fast SCSI-2	UltraSCSI	UltraSCSI
Transfer rate (MB per second)	10 (Narrow)	10 (Narrow)	20 (F10)	20 (F10)
Internal data rate (Mbits/sec - max)	170	121	170	121
Cache	1 MB	1 MB	1 MB	1 MB
Average seek Read/ Write (ms)	7.5/8.5	7.5/8.5	7.5/8.5	7.5/8.5
Average latency (ms)	4.17	4.17	4.17	4.17
Recording metbod	PRML	Peak	PRML	Peak
Head type	MR	MR	MR	MR
RPM	7,200	7,200	7,200	7,200
Power (idle watts)	14.5	13.0	14.5	13.0
Height (inches)	1.6	1.6	1.6	1.6
Form factor (inches)	3.5	3.5	3.5	3.5

[1]Supported on the RA450, RA7000, and RA3000

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Part Number	Qty of FR-RZ1BB-VW or DS-RZ1BB-VW (2.1GB)[1]	Qty of FR-RZ1CB-VW or DS-RZ1CB-VW (4.3GB)[2]	Qty of FR-RZ1CD-VW or DS-RZ1CD-VW (4GB at 1000 rpm)	Qty of FR-RZ1DB-VW or DS-RZ1DF-VW (9.1GB)	Qty of DS-RZ1EF (18.2GB – 1 Narrow)
FR-CK356-UP (6 max.)					Not suppor
FR-CK356-UR (6 max.)					Not suppor
FR-CK450-RP (24 max.)					
FR-CK450-RR (24 max.)					
FR-CK700-UP (24 max)					
FR-CK700-UR (24 max)					
FR-CK300-UP (7 max.)					

[1] Will be available through December 1998, no replacement

[2] Will be available through September 1998, replaced by DS-RZ1CF-VW

Note: *These drives are ultra-capable, but will perform as fast SCSI disks in the storage cabinets. These disks could be used in compliant storage cabinets for ultra levels of performance. Also, these drives are not supported in the DIGITAL Server DIGITAL Server drives in the Cluster Kits. The following matrix lists the number of drives supported in each external s*

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Step 5 Order any optional storage options.

The following table lists storage options.

Storage Options

Feature	BA356	RA450	RA7000	RA3000
	Ultra SCSI-Wide Differential JBOD	6 Fast Narrow Single Ended, SCSI-2	Ultra SCSI Wide Single Ended, 6 channels	Fast Narrow Single Ended, SCSI-2
Hard disk size	2, 4, 9GB	2, 4, 9GB	2, 4, 9GB	2, 4, 9GB
Hot swappable disks	Yes	Yes	Yes	Yes
Disk mirroring in a clustered environment	No	Yes	Yes	
SBB Slots	7 up to 13	24 for disk drives and cache batteries in hot-swap carriers	24 up to 72 with 2 expansion cabinets	7 up to 14
Expansion cabinet	Yes	No	Up to 2	Yes
RAID controller	None	HSZ50	HSZ70	HSZ22
RAID Level (0, 1, 0+1, and adaptive 3/5)	N/A	Yes	Yes	0, 1, 0+1, 4, 5
Redundant controller	N/A	Optional	Optional	Optional
Controller auto failover	N/A	Yes	Yes	
Cache (read/write back)	N/A	32MB up to 64MB and 128 MB	64MB up to 128 MB	16MB
Cache battery	N/A	Single/controller	Single/controller	
Hot swappable cooling fan	No	Yes (up to 8)	Yes (up to 8)	
Power supply	One 180 watt, can order second	Five can order up to eight 150 watt	Five can order up to eight 180 watt	

RA450 Options

QTY	Part Number	Description
	FR-HSZ50-AF	RA450/HSZ50 controller for redundant controller operation in RA450 Cluster Kit **Requires**: QB-5JCAA-SA.
	FR-HSSIM-AA	32MB cache module for RA450/HSZ50 controller

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	FR-SWXBP-SD	Shelf power supply for RA450
	FR-HS35X-BA	Single cache battery
	FR-HS35X-BB	Dual cache battery
	FR-SWXBF-AA	Dual speed fan kit for RA450
	FR-SWXBE-AA	Environmental Monitor Unit for RA450.

RA7000 Options

QTY	Part Number	Description
	DS-HSZ70-AH	Redundant HSZ70 Controller for dual controllers in DS-SWXRA-HC **Requires**: Battery (DS-HS35X-BC) and HSZ70 Solution Software
	DS-HS35X-BC	Single external cache battery
	DS-HSSIM-AB	64MB Controller Cache Memory **Requires**: redundant controllers require equal amounts of cache, one DS-BNK37-1E expansion cable kit
	DS-BNK37-1E	Expansion Cable kit Order one with each expansion cabinet (DS-SWXRA-HB).
	DS-BA35X-HH	180 Watt Power supplies **Requires:** an additional Power control unit (DS-BA35X-HE) when you have more than five 180Watt power supplies
	DS-HS35X-BD	Dual replacement external cache battery **Requires:** order one PVQ (DS-BA35X-EC)
	DS-BA35X-MK	Dual speed fan kit
	DS-BA35X-EB	Environmental Monitor Unit (EMU)
	DS-BA35X-EC	Power Verification and Addressing (PVA)
	DS-BA35X-HE	Power Control Unit **Requires:** an additional Power Control Unit when you have more than five 180Watt power supplies

RA3000 Options

QTY	Part Number	Description
	DS-HSZ22-AA	Second HSZ22 Controller
	DS-HSZ22-AB	Second HSZ22 controller with two 32Mbytes
	DS-SWXRA-GD	Expansion pedestal

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Step 6 Order the operating system and application software, as needed.

Deploying a MSCS environment:

- Windows NT Server, Enterprise Edition (includes Microsoft Cluster Server)

QTY	Item
2	Windows NT Server, Enterprise Edition

Deploying a DCNT environment:

- Windows NT Server 4.0 (required for each server)
- Windows NT Service Pack 3 (required for each server)
- DCNT* v1.1 SP2

QTY	Item	Part number
1*	DCNT v1.1 SP2	QB-53V9A-SA*
2	Windows NT Server, Standard Edition 4.0	Provided with selected Alpha-based DIGITAL Servers if ordered from Compaq
2	Windows NT Server, Standard Edition 4.0 Service Pack 3	Provided with selected Alpha-based DIGITAL Servers if ordered from Compaq Download from http://www.microsoft.com

**DCNT is included, at no additional charge, in the FR-CK450-RP/RR Cluster Kits; otherwise, you must order DCNT separately using part number QB-53V9A-SA.*

Note: *Both Custom Systems and our resellers offer operating system installation services.*

Cluster Quick Start

This is a reprint of the new ***Cluster Quick Start***, a high-level, generic overview of the installation and configuration of two-node clusters on Windows NT. Look for the ***Cluster Quick Start*** in upcoming Cluster Kits.

Whether you are using DIGITAL Clusters for Windows NT or Microsoft Cluster Server to create a highly-available computing environment, the installation consists of many hardware and software components and procedures. To get you started, the ***Cluster Quick Start*** provides a high level, generic overview of the cluster installation and configuration process using a RAID Array and two servers. These instructions include general steps for both DIGITAL Clusters for Windows NT and Microsoft Cluster Server and includes pointers to resources for detailed instructions. This overview *does not replace* the installation and configuration instructions provided in your software and hardware documentation.

Step 1 Unpack the Hardware and Software

- Unpack the Cluster Kit.
- Unpack and setup the new servers.
- Unpack the RAID Array and hard disks.

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Step 2 Install Shared Bus Host Adapters

Install one Adaptec 2944UW host adapter (controller) in each server. 🕮 Refer to your server documentation for specific procedures.

Step 3 Install Network Cards

Install the network cards for the public and private network needs. 🕮 Refer to your server documentation for specific procedures.

Step 4 Install Private Network Cable

Connect the private network with the supplied cross-over network (UTP) cable. Be sure to assign a unique subnet address for this private network.

Step 5 Install Hard Disks

Install the hard disks into the RAID Array. 🕮 Refer to your RAID Array documentation for specific procedures.

Step 6 Connecting Cabling

- Connect the Y cables, terminators, and SCSI cables between the servers and the RAID Array. Terminators should be attached at both ends of the system.
- Power up the first server (Host A).

🕮 Refer to your RAID Array documentation for specific procedures.

Step 7 Configuration Guidelines

Use Adaptec's SCSI*Select* Utility to configure the adapter in each server:

- Specify a unique SCSI ID for each controller on the shared bus; set one to ID6, the other to ID7.
- Disable SCSI Bus resets at IC initialization.
- Set host adapter SCSI termination to Low Off/High Off.

Step 8 Install NT Software

On each server, install and configure either the Microsoft NT Server (NTS) 4.x Service Pack 3, Standard Edition for DIGITAL Clusters for Windows NT or Windows NT server, Enterprise Edition for Microsoft Cluster Server. During the NT installation:

- Configure the LAN and private network Ethernet adapters for IP.
- Assign IP addresses to each of the four adapters.
- Boot both the first (Host A) and second (Host B) servers.

Step 9 Install Host Adapter Drivers on Hosts A and B

Install the Adaptec driver that is appropriate for your server. See the following URL for the correct driver versions at http://www.windows.digital.com/support/support.asp.

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Step 10 Install RAID Drivers on Host A

Install the HSZDISK.SYS class driver for the RAID Array. 🕮 Refer to your StorageWorks RAID Arrays for Windows NT Clusters Installation Guide for specific procedures.

Step 11 Install Console Software on Host A

Install StorageWorks Command Console to create logical units (LUNs). 🕮 Refer to your StorageWorks RAID Arrays for Windows NT Clusters Installation Guide for specific procedures.

Step 12 Partition Drives on Host A

- Use Microsoft's Disk Administrator to format and partition your disk drives in the RAID Array.
- Assign high order drive letters (K and up) to the shared drives. Assign Y to the CD-ROM drive.
- Shut down Host A.

Step 13 Install RAID Drivers on Host B

- Install the HSZDISK.SYS class driver for the RAID Array.
- Reboot Host A.

🕮 Refer to your StorageWorks RAID Arrays for Windows NT Clusters Installation Guide for specific procedures.

Step 14 Review RAID Array

- Reboot Host B and use Microsoft's Disk Administrator to verify that Host B can recognize the RAID Array.
- Assign high order drive letters (K and up) to the shared drives. All shared drives included in the cluster must have identical drive assignments. Assign Y to the CD-ROM drive.

Step 15 Review Network Addresses

- Verify that clients are on the same subnet network mask as servers; node and cluster aliases should be the same.
- Shut down Host B.

🕮 Refer to your Microsoft Cluster Server Administrator's Guide for specific procedures.

Step 16 Choose Windows NT Cluster Software

Install Microsoft Cluster Server (go to **16a**) or DIGITAL Clusters for Windows NT (go to **16b**).

Step 16a Install Microsoft Cluster Server

- Boot Host A.
- From the Microsoft Windows NT Server, Enterprise Edition Installer dialog box, select the Microsoft Cluster Server check box and start the installation.
- Install Microsoft Cluster Server on Host A.
- Boot Host B and install Microsoft Cluster Server on Host B.

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📖 Refer to your Microsoft Cluster Server Administrator's Guide for specific procedures.

Step 16b Install DIGITAL Clusters for Windows NT

- Use the Cluster Checkout Utility on the Quick Launch CD to verify the connections in your cluster.
- Turn off the power for the RAID Array, and boot both servers.
- On Host A, install DIGITAL Clusters for Windows NT. Leave Host A up and running. Do not reboot the server at this time.
- On Host B, install DIGITAL Clusters for Windows NT.
- Turn on power for the RAID Array.
- Reboot the servers one at a time.
- Run the DIGITAL Cluster Administrator on both servers to verify the cluster installation.
- Use the DIGITAL Cluster Administrator to set up your shared disks in failover groups.
- Install DIGITAL Clusters for Windows NT client software on each client as needed.

📖 Refer to your DIGITAL Clusters for Windows NT Installation and Configuration Guide. For information on the Cluster Administrator, see your DIGITAL Clusters for Windows NT Administrator's Guide for specific procedures.

Pointers for More Information

For the latest information on **DIGITAL Server Cluster Kits**, go to:

http://akin40.mro.dec.com/DSClusterKits.htm

For the latest information on **DCNT**, go to:

http://www.windows.digital.com/clusters

For the official **Microsoft Hardware Compatibility List** go to:

http://www.microsoft.com/hwtest

For the latest information on the status of our **Microsoft Cluster Server qualification and certification efforts**, go to:

http://akin40.mro.dec.com/clusters/DSClusterKits.htm

A Special Thanks

Thanks to all who contributed to this guide. A special thanks goes to Barbara Landino for her cluster-specific information on ServerWORKS Manager.

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